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LABORATORY

EVALUATING AN AIR FORCE
PILOT RETENTION BONUS

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The Air Force Human Resources Laboratory, in response to a request by Headquarters Air Force, initiated research into the application of human resource accounting (HRA) methodologies to value an individual's experiences in the Air Force. This paper details the development and application of three HRA models, previously developed and applied to selected enlisted jobs and to Air Force pilots to help determine the economic viability of a pilot retention bonus. The full investment cost (FIC) model determined value by estimating investment cost (such as training or separation costs) while the stochastic rewards valuation (SRV) model used future returns to the Air Force of an individual choosing to remain in service. The expected net present value (ENPV) model combined the two approaches of FIC and SRV. This paper provides an in-depth description of each model, concluding that all three, although each offers different insights, show a bonus to be an economically sound policy initiative.

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SUMMARY

In response to a request by Headquarters Air Force, Personnel Plans Directorate, Analysis Division (HQ AF/DPXA), the Air Force Human Resources Laboratory (AFHRL) initiated a research program to determine the worth of an individual's experience in the Air Force through the use of human resource accounting (HRA) modeling technology. Initial results indicated that it was possible to develop measures of the value of Air Force experience using three HRA models: full investment cost (FIC), stochastic rewards valuation (SRV), and expected net present value (ENPV). The FIC model calculates the Air Force's investment in a person by accounting for accession, training, and separation costs while the SRV model looks at the benefits that the Air Force could expect to receive from a person over a given future time horizon. The ENPV combines the costing approach of the FIC with the forward-looking approach of the SRV to account for the future benefits minus the future costs of personnel policy decisions made by the Air Force. This study applied the three models to determine if a retention bonus for pilots would be economically advantageous to the Air Force. The three models used weapon-system-specific retention and cost data to determine value under both bonus and nonbonus retention scenarios. All three approaches reached the same conclusion: that the bonus payment plans being considered by the Air Force for all pilots would be an economical method to improve retention. These results are included in an Air Staff report to Congress evaluating the pilot bonus.

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PREFACE

The work was performed in response to a Request for Personnel Research (RPR) 85-02 for research entitled "Quantifying Experience in the Cost of Human Capital," submitted by Headquarters Air Force, Personnel Plans Directorate, Analysis Division (HQ AF/DPXA). It is part of the Manpower and Personnel Division's econometric modeling research and development program and is an integral component of research to assist Air Force personnel planners in making the best use of limited fiscal and personnel resources to accomplish the Air Force defense mission.

Appreciation is expressed to Lt Col Jim Hoskins and Capt Mike Fuller of AF/DPXA for their assistance in the data collection and editing efforts which were essential for the completion of this research. Appreciation is also expressed to Mr. Andrew Rettenmaier of RRC, Inc. (subcontractor) for assistance in the data development and analysis; Ms. Rebecca Wortman of RRC, Inc. for her insights and editorial comments; Mr. Jonathan Fast of Metrica, Inc. (prime contractor) for his suggestions and general comments; and Mrs. Kathy Berry and Mrs. Carol Pulliam of RRC, Inc. for applying their word processing skills to prepare this final copy.

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I. INTRODUCTION

The Air Force is frequently required to address the impact of compensation and personnel policy alternatives on the composition mix of the enlisted and officer forces. Currently, there is a shortage of pilots in the Air Force, as evidenced by the cumulative continuation rates (CCR) for 1987 and 1988 of 48% and 43%, respectively. The CCR is the percent of officers entering a year of service group who would complete a designated period of service if current retention patterns remained the same, computed on a 12 month basis. For example, a CCR of 43% for Air Force pilots in the 6-11 year of service group means that for every 100 pilots entering the 6th year of commissioned service, 43 would complete the 11th year if current retention rates continued (Quarterly Officer Retention Report, 1988). The 1988 CCR for pilots is a 13 percentage point decrease from the 1986 rate of 56%. The objective or force sustaining rate is considered to be 64% (Air Force Times, January 1988).

Although there are many factors responsible for this decline in retention, one primary reason is the boom in commercial airline hiring. The Air Force competes with the private sector for pilots because the military and civilian pilot positions require comparable specialized skills. Commercial airlines have a high demand for well-trained pilots, while the Air Force provides its pilots with an extensive training program. In fact, the future expected demand by the airlines could become greater than the number of military pilots finishing their initial commitment of 6 years. Thus, the airlines could potentially hire every military pilot who wanted to leave the service, creating an even greater retention problem for the Air Force since it cannot compete with salaries paid by the airlines (Air Force Times, November 1987).

Many alternative solutions to encourage pilots to remain on active duty have been considered, such as reducing the duties of the military pilots, altering promotion and assignment policies, extending the active duty service commitment for training, and increasing career incentive pay. The active duty service commitment for pilots was increased to 7 years in June 1987 and then to 8 years in June 1988. Since these policy changes apply only to classes of pilots in undergraduate pilot training (UPT) at the time of the change and to all future classes, the effect on the pilot force structure will not be fully felt until 1994.

Presently, the Air Force is considering a bonus for each additional year of commitment beyond the current post UPT commitment. Discussion has centered on the amount and distribution of the bonus. A House-Senate committee on the bonus developed a plan in which criteria were set regarding which pilots could receive the bonus. Among other limitations, the committee said that in order to receive a bonus, a pilot must be in a "critical," or severely under-manned, career field. The Air Force, unlike the Navy, would distribute the bonus evenly among all pilot career fields because all pilots are in high demand (Air Force Times, July 1988). The bonus would consist of $12,000 annually for each aviator who decided to commit through at least 14 years of service, but would be limited to $6,000 for a 2 year or less commitment.

Are Air Force pilots worth a bonus program? How sensitive will these pilots be to a $12,000 annual bonus? How much money is it worth to the Air Force to avoid the high training costs to replace pilots in order to receive 2 or more years of additional service beyond year 6? Ultimately the answer to these questions is in the value to the Air Force of the additional years of obligated service versus the training and development costs of replacing pilots. The objective of this study is to assess the economic feasibility of a pilot bonus program by applying human resource accounting and human capital methodologies for valuing Air Force experience.

II. FULL INVESTMENT COST MODEL

In human resource accounting, the concept of investment cost refers to the investment or sacrifice incurred to replace a person in a specified position with a substitute who is capable of rendering equivalent services in the given position (Flamholtz, 1985). The full investment cost model (FICM) is a stochastic approach that recognizes that an organization must often acquire, develop, and

separate many individuals in order to gain one individual on the desired level. The Air Force allows entry only on the lowest level, which makes the FICM appropriate for Air Force personnel. In addition, FICM can provide an estimate of the actual cost savings associated with a pilot bonus program.

The full replacement cost of an Air Force pilot may be operationally defined as:

1. the cost to commission one person multiplied by the number of new recruits needed to gain one person at the critical level, plus

2. the cost to select one pilot multiplied by the number of new recruits needed to gain one person at the critical level, plus

3. the cost to train and develop one pilot at each intermediate level multiplied by the number of people that must be developed on that level to gain one person at the critical level, plus

4. the cost to separate one pilot on each intermediate level multiplied by the number of people that separate on that level (attrition) before gaining one person at the critical level.

FICM does not consider all costs incurred to fully train and compensate personnel (e.g., pay and other benefits) to attain a desired level of experience and capability. These costs represent the normal personnel investments made by the Air Force for which it receives equivalent value in return.

III. HUMAN RESOURCE VALUE MODELS

Although cost models look at the historical investments in people and are thus estimates of the value of experience, they do not provide a complete picture. For example, an individual with 20 years of service would probably be extremely valuable from a cost standpoint since he/she has extensive training and experience. However, if that individual has a high probability of retiring in the next few years, the expected realizable value associated with his/her future service may be quite low. In such a situation, the Air Force must look beyond replacement cost estimates to determine appropriate compensation levels.

Stochastic Rewards Valuation Model

The Stochastic Rewards Valuation Model (SRVM) (Flamholtz, 1985) was selected for the valuation of Air Force experience for a number of reasons. First, it has behavioral foundations (e.g., personnel behavior engenders variations in attrition which affect the values for SRVM) and may be expressed in monetary terms. Second, this model has been subjected to more validation and reliability testing than any other value based model (Flamholtz & Lundy, 1975; Flamholtz & Searfoss, 1985). Finally, its treatment of human resource mobility as a stochastic process is particularly appropriate in the Air Force's internal labor market which experiences attrition at all points along the career ladder.

SRVM is based on the concept that an individual is valuable to an organization only in relation to the roles he/she may potentially occupy. Thus, an individual's value is determined by expected future services to an organization. SRVM views the movement of people among organizational roles over time as a stochastic process with service state rewards. Movement of people from one service state to another is probabilistic, depending upon the service states previously occupied. The model defines service states as organizational roles and the state of exit as separation from active duty. Rewards represent the value of services rendered to the organization by the occupation of organizational roles.

Since future states are an uncertain phenomena, the model provides a measure of the expected value of a person's services. Thus, the measurement of a pilot's value to the Air Force involves:

1. Estimating the time period during which the pilot is expected to render services to the Air Force.

2. Identifying the service states which the pilot may occupy.

3. Measuring the service state value, which is the value derived by the Air Force if the individual occupies the state for a specified time period.

4. Estimating transition probabilities; that is, the probability that a pilot will occupy each service state (including exit) at specified future times.

The result is a monetary measure of the pilot's present worth of services expected to be derived during the pilot's anticipated tenure in the Air Force, accounting for the probability of exit.

SRVM has been operationalized twice in international Certified Public Accountant (CPA) firms (Flamholtz & Lundy, 1975; Flamholtz & Searfoss, 1985). In addition, it was used to value the human assets in an acquired securities brokerage firm for income tax purposes (Flamholtz, Geis, & Perle, 1986).

Definition of Service State Values

The first step in the calculation of costs and values for pilots at different stages in their careers is the definition of positions, or "service states," in the Air Force career ladder. Proficient individuals within a service state provide services to the Air Force of approximately equal value to each other. Individuals in each year of service (YOS) are assumed to provide approximately equally valuable services to the Air Force. YOS was selected to define service states because it represents experience in the Air Force personnel structure. Thus, for the remainder of this analysis, service states defined by YOS will be used as the basis for the computation of costs and value.

SRVM involves the determination of the economic value of an individual occupying a given position for one period. This is referred to as the service state value. In the Air Force, a measure of this value is the cost of similar services purchased externally. Wages paid to commercial airline pilots are a logical surrogate for the value of the services rendered by Air Force pilots. This surrogate is discussed in greater detail in Section VI.

Expected Net Present Value Model

In an effort to improve on the usefulness of SRVM for policy and personnel decisions, the expected net present value model (ENPVM) was developed. The only difference between SRVM and ENPVM is the inclusion of all the future expected costs of maintaining pilot skills, additional training, special pay, and compensation. Thus, each service state value represents the value of the product produced by the pilot minus any costs which are deducted from the value to be gained. The same present value calculation is performed for ENPVM as for SRVM which accounts for the probability of exit based on the transition matrix. ENPVM uses the cost aspects of FICM and the value perspective of SRVM to produce an expected present value of future service to be rendered during a given service tenure.

IV. GENERAL DATA REQUIREMENTS AND DEVELOPMENT

The sources for data for the analysis were the Master Officer Personnel File records, commonly called Uniform Officer Records (UOR), AFR 173-13, ATC Cost Factors (1988), and Air Staff personnel at the Pentagon. Personnel inventories developed from UOR snapshots in September

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1986 and September 1987 were used to compute the transition matrix for YOS cohorts 1 to 29. The transition matrix contains the probability of separating from the Air Force in a given YOS, as well as the probability of progressing from that YOS to the next. Of course, the estimation of FICM and SRVM are both sensitive to transition rates. The transition rates for September 1986 to September 1987 were selected because they were the most recently available at the time of the study. The September 1986 to September 1987 transition rates will provide different values for FICM, SRVM, and ENPVM than would a high retention time period such as the early 1980's. Transition matrices were developed for each of seven major weapon systems categories: bombers, fighters, tankers, strategic airlift (SAL), tactical airlift (TAL), helicopters, and trainers.

The sources for training costs such as commissioning costs, UPT, lead-in-training, and other training was the Air Training Command's FY88 Cost Factors (1986) and AFR 173-13. Lead-in-training provides the UPT graduate with the opportunity to begin learning additional combat skills that will be employed in the aircraft to which he is assigned. The initial cost of commissioning an officer who is to become a pilot was calculated as a weighted average of the three primary sources of commissioning: Air Force Reserve Officer Training Corps (AFROTC), Officer Training School (OTS), and the Air Force Academy. The weights were based on the proportion of officers from each source of commission who entered UPT during FY88.

Other training costs were also calculated as a weighted average for each of the seven weapon systems and pilots in general. The costs are provided in AFR 173-13 by aircraft. A pilot distribution objective plan for FY89, provided by AF/DPXA, was used in the estimation of average additional training costs to determine the proportion of costs contributed by each aircraft and weapon system. UPT and lead-in-training costs were obtained directly from AFR 173-13. Flight simulator costs for pilots in general and by weapon system were derived using both flight simulator costs by aircraft and the FY89 pilot distribution plan.

It was assumed that pilots leave lead-in-training with an initial ability to perform the duties and responsibilities of an Air Force pilot at less than 100% proficiency. Thus, during the first 500 to 1,000 flying hours, depending on the aircraft, the pilot receives on the job training (OJT). The less-than-100% performance during OJT represents a loss in productivity to the Air Force. For this analysis, two different scenarios were used to calculate the costs of this lost productivity. Productivity scenario 1 assumed that pilots enter this OJT period at 50% of full proficiency and increase their proficiency to 100% during the first 500 to 1,000 flying hours. The learning curve is assumed to be linear. Figure 1 presents an example of this learning relationship. Time period t_n represents the date the pilot begins training in the aircraft at 50% proficiency, and time period t_{n+i} is the point the pilot attains 100% proficiency. The area of the triangle ABC represents lost productivity. Thus, a proportion of the pilots' military compensation and the cost of flying and operating the aircraft were used as an estimate of the cost of the lost productivity during the t_n to t_{n+i} time period.

An alternative productivity scenario assumed that the pilot enters the aircraft at 0% proficiency and requires a longer time period for OJT to attain 100% proficiency. The area enclosed by triangle DBE in Figure 1 represents the lost productivity from productivity scenario 2. The pilot begins OJT at time t_n and reaches 100% proficiency at time t_{n+j}. Productivity scenario 1 is the more conservative estimate of lost productivity, as evidenced by the larger area of triangle DBE versus ABC. The aircraft operating costs used in the estimate of the lost productivity costs were determined by averaging across aircraft based on the FY89 pilot distribution plan.

V. FULL INVESTMENT COST CALCULATION

FICM estimates were initially calculated for pilots in general using the attrition rates for FY88. Similar calculations were performed for each of seven major weapon systems. Calculations are also presented for both of the pilot proficiency scenarios. In order to determine the impact of a proposed pilot bonus program, the FICM estimates for pilots in general were re-calculated with the

OJT For Pilots
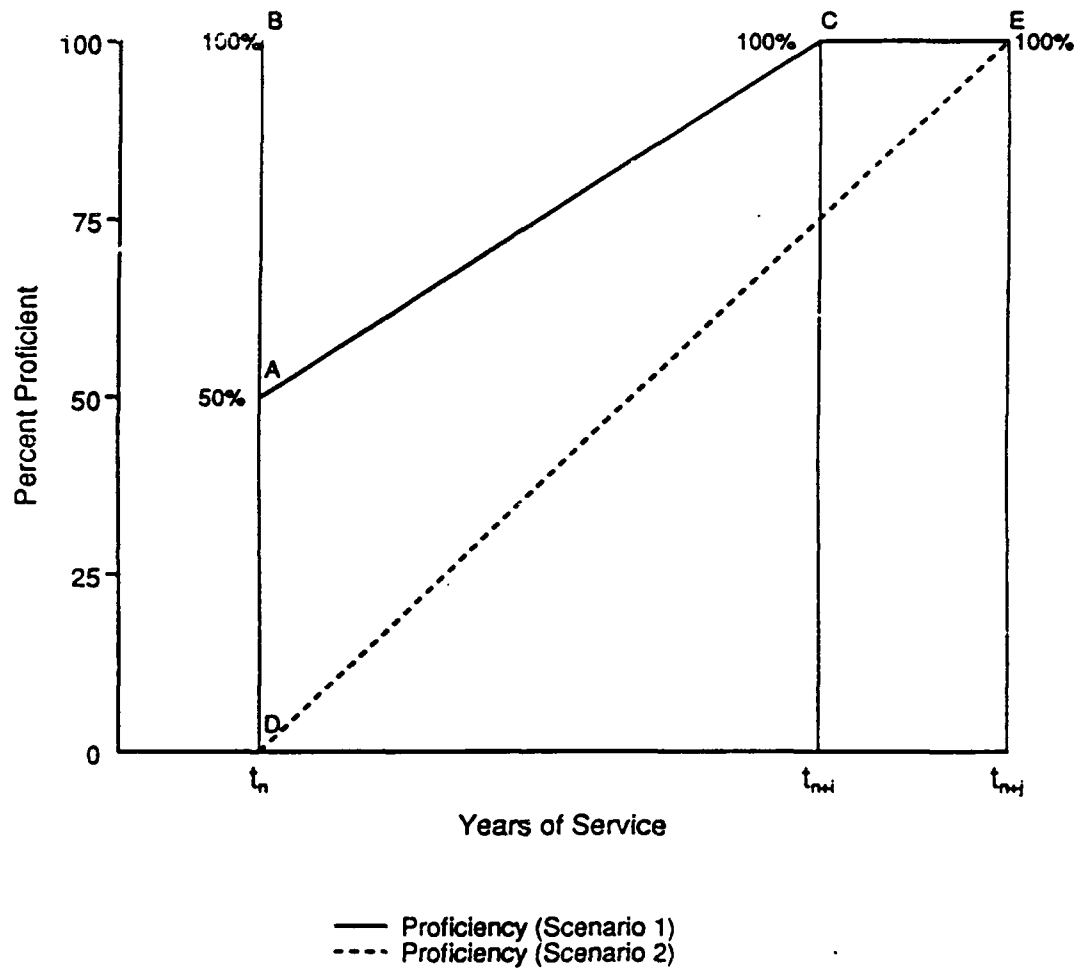
Figure 1. OJT for Pilots.

use of attrition rates which reflected the impact of the pilot bonus.[1] Projected attrition rates under the pilot bonus program were not available for the seven major weapon systems, thus the comparison of the FICM estimates with and without a bonus was performed only for pilots in general.

The Estimation of FICM for Pilots in General

The component costs of FICM for pilots in general are presented in Table 1. Column (2) presents the number of officers which must be commissioned in order to obtain one officer at the designated YOS. For example, 2.0231 officers must be commissioned in order to obtain one officer in YOS 7. Column (3) presents the cost of commissioning a pilot plus the cost of UPT. Column (4) provides the cost of lead-in-training which applies only to fighter pilots. Columns (5) and (6) present the costs of other training and lost productivity, respectively. Column (7) presents the cost estimate for the minimum required pilot simulator time.

The sum of all the costs for each YOS, columns (3) through (7), yields an estimation of the service state cost, Column (8). Column (9) is the accumulated service state costs which is the cost of replacing a single individual at each service state, excluding attrition. For example, the individual replacement cost for YOS 7 indicates an accumulated cost of $1,256,379, the amount required to train and develop a single pilot over the first 7 years of active duty. Since the only training cost incurred in YOS 8 is based on minimum required simulator time, $19,287, the increase in the individual replacement cost from YOS 7 to 8 is equal to the cost of the simulator time. However, FICM recognizes that to replace a pilot at each YOS requires an investment in more than one officer at each stage of the career ladder.

Column (10) in Table 1 contains the full cost of replacing an individual in each YOS. The calculation of FICM for each YOS includes all the investments which were estimated in columns (3) through (6) as necessary development activities in the production of Air Force pilot capabilities. Estimates of FICM also include the lost investment in individuals who separated at each service state in the progression to any selected YOS. For example, to replace an individual in YOS 7, which is the equivalent of a fully trained and experienced pilot, the Air Force will recruit 2.0231 new officers and invest $1,899,218 over 7 years. The cost to the Air Force of replacing a pilot in YOS 14 is $3,539,479 and requires 3.5874 recruits. When a single pilot reaches voluntary retirement at 20 years, the Air Force has incurred a full replacement cost of $5,853,109 and lost 4.7513 pilots along the career path. Between YOS 6 and 7, the replacement number (column (2)) increases 31.1% with an additional 20.2% increase occurring between YOS 7 and 8. From YOS 7 to 14, the replacement number increases 77.3%. The change in the replacement number is the primary reason for the 86.4% increase in the FICM value from YOS 7 to 14. Table 2 presents the FICM values assuming a less conservative estimation of the lost productivity costs (productivity scenario 2) as reflected by the differences in costs in column 6. As a result, the FICM values increase for each YOS beyond YOS 1. For example, the FICM value for YOS 7 increases to $2,679,329, a 41.1% increase from Table 1.

FICM Estimates by Weapon System

Tables 3 and 4 present the FICM estimates for each of the weapon systems under productivity scenarios 1 and 2, respectively. Appendices A and B provide detailed tables similar to Tables 1 and 2 for each of seven major weapon systems. The FICM estimates vary across weapon systems and YOSs. Fighters, which have the largest additional training costs under productivity scenario 1, exhibit the highest FICM value for YOS 7, $2,526,462 in Table 3. Bombers follow at a distant

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[1]These attrition rates were provided by the Analysis Division, Directorate of Personnel Plans, Deputy Chief of Staff for Personnel (AF/DPXA.) They were derived from application of an officer force analysis model which accounts for a number of economic factors including the pilot retention bonus. The model showed an increase in retention due to the bonus equating to a decrease in replacement number values for the 7th through the 30th year of service.

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Table 1. FICM Results for Pilots (No Bonus): Productivity Scenario 1

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,096	$ 0	$ 0	$ 0	$ 0	$306,096	$ 306,096	$ 458,929
2	1.5043	0	62,492	580,279	76,911	0	719,682	1,025,777	1,182,541
3	1.5118	0	0	0	106,351	19,287	125,638	1,151,415	1,314,701
4	1.5136	0	0	0	27,816	19,287	47,103	1,198,518	1,363,426
5	1.5136	0	0	0	0	19,287	19,287	1,217,805	1,382,713
6	1.5432	0	0	0	0	19,287	19,287	1,237,092	1,429,417
7	2.0231	0	0	0	0	19,287	19,287	1,256,379	1,899,218
8	2.4318	0	0	0	0	19,287	19,287	1,275,666	2,306,075
9	2.7668	0	0	0	0	19,287	19,287	1,294,953	2,645,700
10	2.9915	0	0	0	0	19,287	19,287	1,314,240	2,881,418
11	3.2550	0	0	0	0	19,287	19,287	1,333,527	3,156,207
12	3.4619	0	0	0	0	19,287	19,287	1,352,814	3,377,341
13	3.5090	0	0	0	0	19,287	19,287	1,372,101	3,442,840
14	3.5874	0	0	0	0	19,287	19,287	1,391,388	3,539,479
15	3.6415	0	0	0	0	19,287	19,287	1,410,675	3,612,434
16	3.7011	0	0	0	0	19,287	19,287	1,429,961	3,691,161
17	3.7590	0	0	0	0	19,287	19,287	1,449,248	3,768,494
18	3.7825	0	0	0	0	19,287	19,287	1,468,535	3,811,461
19	3.8993	0	0	0	0	19,287	19,287	1,487,822	3,949,038
20	5.7513	0	0	0	0	19,287	19,287	1,507,109	5,853,109
21	7.5703	0	0	0	0	19,287	19,287	1,526,396	7,729,695
22	8.8425	0	0	0	0	19,287	19,287	1,545,683	9,051,210
23	10.2696	0	0	0	0	19,287	19,287	1,564,970	10,534,394
24	11.8315	0	0	0	0	19,287	19,287	1,584,257	12,158,786
25	13.6183	0	0	0	0	19,287	19,287	1,603,544	14,017,213
26	15.7650	0	0	0	0	19,287	19,287	1,622,831	16,249,122
27	20.3221	0	0	0	0	19,287	19,287	1,642,118	20,971,027
28	30.0413	0	0	0	0	19,287	19,287	1,661,404	31,029,092
29	39.2848	0	0	0	0	19,287	19,287	1,680,691	40,601,750

[a] Undergraduate Pilot Training.

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Table 2. FICM Results for Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,096	$0	$0	$0	$0	306,096	$306,096	$458,929
2	1.5043	0	62,492	580,279	162,740	0	805,510	1,111,606	1,268,656
3	1.5118	0	0	0	318,994	19,287	338,281	1,449,887	1,614,949
4	1.5136	0	0	0	198,827	19,287	218,113	1,668,000	1,835,245
5	1.5136	0	0	0	88,076	19,287	107,363	1,775,363	1,942,607
6	1.5432	0	0	0	20,454	19,287	39,741	1,815,104	2,021,115
7	2.0231	0	0	0	3,363	19,287	22,650	1,837,754	2,679,329
8	2.4318	0	0	0	0	19,287	19,287	1,857,040	3,243,782
9	2.7668	0	0	0	0	19,287	19,287	1,876,327	3,712,582
10	2.9915	0	0	0	0	19,287	19,287	1,895,614	4,034,945
11	3.2550	0	0	0	0	19,287	19,287	1,914,901	4,411,341
12	3.4619	0	0	0	0	19,287	19,287	1,934,188	4,712,255
13	3.5090	0	0	0	0	19,287	19,287	1,953,475	4,795,916
14	3.5874	0	0	0	0	19,287	19,287	1,972,762	4,922,787
15	3.6415	0	0	0	0	19,287	19,287	1,992,049	5,016,603
16	3.7011	0	0	0	0	19,287	19,287	2,011,336	5,118,312
17	3.7590	0	0	0	0	19,287	19,287	2,030,623	5,217,971
18	3.7825	0	0	0	0	19,287	19,287	2,049,910	5,270,000
19	3.8993	0	0	0	0	19,287	19,287	2,069,197	5,452,615
20	5.7513	0	0	0	0	19,287	19,287	2,088,484	6,070,820
21	7.5703	0	0	0	0	19,287	19,287	2,107,770	10,648,816
22	8.8425	0	0	0	0	19,287	19,287	2,127,057	12,460,893
23	10.2696	0	0	0	0	19,287	19,287	2,146,344	14,494,369
24	11.8315	0	0	0	0	19,287	19,287	2,165,631	16,721,033
25	13.6183	0	0	0	0	19,287	19,287	2,184,918	19,268,452
26	15.7650	0	0	0	0	19,287	19,287	2,204,205	22,328,133
27	20.3221	0	0	0	0	19,287	19,287	2,223,492	28,807,263
28	30.0413	0	0	0	0	19,287	19,287	2,242,779	42,613,068
29	39.2848	0	0	0	0	19,287	19,287	2,262,066	55,750,035

[a] Undergraduate Pilot Training.

Table 1. FICM Results by Weapon System (No Bonus): Productivity Scenario 1

YOS	Aggregate	Bomber	Fighters	Helicopters	SAL	TAL	Tanker	Trainer
1	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929
2	1,182,541	989,226	1,895,905	596,338	756,784	622,084	763,788	617,177
3	1,314,701	1,275,309	2,111,305	606,551	960,116	708,433	874,966	633,222
4	1,363,426	1,350,471	2,173,884	649,534	997,130	730,118	893,966	634,399
5	1,382,713	1,382,400	2,229,182	656,927	1,019,601	741,130	897,853	648,546
6	1,429,417	1,457,514	2,272,796	671,386	1,068,890	773,147	904,838	668,286
7	1,899,218	1,704,415	2,526,462	763,626	1,433,614	948,653	1,309,280	920,512
8	2,306,075	2,029,493	2,879,033	807,159	2,036,215	1,170,341	1,595,135	1,382,533
9	2,645,700	2,223,556	3,317,681	833,946	2,357,498	1,290,978	1,912,848	1,522,080
10	2,881,418	2,324,530	3,712,600	860,459	2,659,092	1,461,626	2,059,194	1,628,309
11	3,156,207	2,517,127	4,177,916	938,697	3,093,137	1,651,897	2,284,125	1,769,156
12	3,377,341	2,703,545	4,516,516	1,064,350	3,503,337	1,779,252	2,578,860	2,065,388
13	3,442,840	2,987,011	4,733,750	1,175,459	3,663,090	1,911,311	2,806,584	2,164,972
14	3,539,479	3,165,491	4,913,218	1,208,019	3,769,168	1,934,292	2,842,962	2,217,724
15	3,612,434	3,246,992	5,003,138	1,242,420	3,868,733	2,043,179	2,887,229	2,218,901
16	3,691,161	3,314,953	5,081,622	1,249,812	3,900,126	2,062,963	2,935,594	2,220,077
17	3,768,494	3,346,883	5,186,504	1,257,205	3,986,863	2,069,690	2,982,497	2,221,254
18	3,811,461	3,378,812	5,267,654	1,264,597	4,011,686	2,076,417	3,028,445	2,222,430
19	3,949,038	3,410,741	5,307,542	1,271,989	4,075,438	2,095,186	3,032,331	2,223,607
20	5,853,109	4,529,828	7,015,829	1,686,457	6,095,397	2,902,642	4,388,988	2,838,517
21	7,729,695	6,965,927	9,610,875	2,246,943	8,786,464	4,055,484	6,261,108	4,130,464
22	9,051,210	8,933,433	11,051,681	3,049,983	10,749,006	4,458,525	8,019,193	4,566,550
23	10,534,394	11,338,546	13,227,213	3,417,067	12,713,036	5,358,303	10,279,571	6,851,590
24	12,158,786	13,377,030	16,202,302	3,913,667	15,194,783	6,572,162	13,088,036	7,379,902
25	14,017,213	15,643,785	19,459,983	4,182,464	18,900,978	7,401,250	14,688,499	8,611,259
26	16,249,122	19,950,909	22,804,934	4,788,407	24,818,266	9,328,564	23,507,816	8,612,436
27	20,971,027	25,432,703	28,468,164	7,193,699	29,791,732	11,557,980	32,916,384	10,336,335
28	31,029,092	50,929,265	43,600,551	12,601,909	47,408,948	14,581,587	47,551,501	....
29	40,601,750	64,372,035	61,610,032	12,609,301	65,198,548	18,756,404	71,333,081	....

Table 4. FICM Results by Weapon System (No Bonus): Productivity Scenario 2

YOS	Aggregate	Bomber	Fighters	Helicopters	SAL	TAL	Tanker	Trainer
1	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929	$458,929
2	1,267,180	1,156,873	2,006,459	600,089	925,252	697,760	857,626	639,460
3	1,611,187	1,961,053	2,526,453	629,647	1,410,854	908,883	1,218,792	720,144
4	1,829,968	2,594,640	2,858,807	687,061	1,603,046	1,037,124	1,501,912	759,777
5	1,936,522	3,021,559	3,027,367	697,290	1,635,306	1,098,179	1,638,094	782,070
6	2,014,515	3,366,484	3,073,639	712,179	1,709,223	1,142,996	1,793,494	805,625
7	2,670,306	3,935,655	3,401,332	809,517	2,285,920	1,398,544	2,611,570	1,109,352
8	3,232,621	4,637,436	3,860,496	855,202	3,239,909	1,721,457	3,177,058	1,665,794
9	3,699,587	5,036,619	4,433,224	883,133	3,745,541	1,895,428	3,805,242	1,833,667
10	4,020,611	5,223,708	4,946,101	910,764	4,219,297	2,142,427	4,092,239	1,961,385
11	4,395,460	5,613,976	5,551,261	993,108	4,902,449	2,417,799	4,534,996	2,130,781
12	4,695,086	5,988,081	5,987,124	1,125,563	5,547,189	2,600,855	5,115,859	2,487,284
13	4,778,248	6,573,574	6,261,597	1,242,596	5,795,167	2,790,571	5,563,457	2,606,959
14	4,904,456	6,926,158	6,485,739	1,276,583	5,958,101	2,821,004	5,631,705	2,670,234
15	4,997,731	7,065,965	6,591,543	1,312,508	6,110,624	2,976,559	5,715,529	2,671,411
16	5,098,864	7,175,892	6,682,183	1,319,901	6,155,441	3,002,288	5,807,406	2,672,587
17	5,197,954	7,207,822	6,807,377	1,327,293	6,287,510	3,009,015	5,896,336	2,673,764
18	5,249,594	7,239,751	6,901,323	1,334,685	6,321,920	3,015,743	5,983,324	2,674,941
19	5,431,309	7,271,680	6,941,211	1,342,078	6,417,610	3,039,941	5,987,211	2,676,117
20	8,039,009	9,610,011	9,159,203	1,778,847	9,591,433	4,207,304	8,660,397	3,415,858
21	10,606,600	14,723,504	12,530,450	2,369,501	13,819,220	5,874,104	12,349,094	4,970,232
22	12,411,277	18,836,723	14,395,066	3,215,796	16,900,153	6,454,570	15,811,815	5,494,714
23	14,436,441	23,863,295	17,214,355	3,602,387	19,982,572	7,753,557	20,263,867	8,243,837
24	16,653,993	28,112,028	21,071,555	4,125,462	23,877,840	9,506,349	25,795,323	8,879,245
25	19,190,987	32,834,616	25,293,899	4,408,378	29,696,130	10,702,210	28,945,454	10,360,492
26	22,238,153	41,830,149	29,627,650	5,046,595	38,986,904	13,485,329	46,318,945	10,361,669
27	28,690,936	53,279,008	36,970,317	7,580,980	46,794,098	16,704,451	64,851,964	12,435,414
28	42,440,720	106,621,874	56,603,844	13,279,652	74,458,166	21,070,615	93,680,673	....
29	55,524,315	134,720,593	79,967,623	13,287,044	102,391,223	27,099,441	140,526,839	....

second with $1,704,415. In Table 4, fighters and bombers reverse the ranking displayed in Table 3. The lowest FICM values at YOS 7 for non-trainer, fix-winged aircraft are $948,653 for TAL in Table 3 and $1,398,544 for TAL in Table 4. At YOS 14 in Table 3, the fighters still exhibit the highest FICM value, but are followed by SAL. The ranking in Table 4 at the 14 year point is the same as at the 7 year point.

At YOS 20 in Table 3, fighters and SAL still lead all other weapon systems. YOS 20 FICM values range from a high of $7,015,829 to a low of $2,902,642, excluding helicopters and trainers, a 141.7% difference in the FICM values. At YOS 20 in Table 4, bombers and SAL have become the leaders in FICM values with bombers having the highest FICM value of $9,610,011 and TAL the lowest FICM value of $4,207,304, a 128.4% difference, again excluding helicopters and trainers. The differences in FICM between weapon systems are primarily attributable to the differences in attrition, training costs, and the time required to attain proficiency.

FICM Estimates Accounting for the Effect of a Pilot Bonus

Table 5 presents the calculation of FICM for pilots in general, using productivity scenario 1 and continuation rates which reflect the effect of a pilot bonus program. The pilot bonus is expected to reduce pilot attrition beginning with YOS 7 , which, in turn, increases the pilot continuation rates. Comparison of Column 1 in Tables 1 and 5 reflects the change in the continuation rates due to the effect of the pilot bonus. The pilot bonus paradigm consists of seven installments from the end of YOS 8 through the end of YOS 14 which sum to $84,000. The present discounted value of the seven payments, using a T-bill rate of 6.21% as the discount rate, is $66,491. Comparison of FICM values for the bonus versus non-bonus scenarios indicates a decrease in the FICM beginning with YOS 7. For example, the pilot bonus program reduces the full replacement cost of obtaining a pilot by $61,617 in YOS 7, $123,550 in YOS 8, $214,653 in YOS 14, and $289,696 in YOS 20.

The savings in replacement costs increase with each additional YOS as the effect of the reduced attrition accumulates. The same result is displayed in Table 6 which provides the bonus paradigm using productivity scenario 2. Thus, the annual $12,000 bonus is more than recaptured by the reduction in the FICM value for any YOS beyond 7. A bonus analysis by weapon system is not provided since the impact of the pilot bonus on attrition by weapon system was not available. An analysis similar to the one performed for pilots in general must be performed by weapon system to determine whether the pilot bonus on a weapon system basis is economically justifiable.

VI. STOCHASTIC REWARDS VALUATION CALCULATION

The estimation of SRVM for pilots represents a monetary valuation of the future expected services to be provided by pilots from continued active duty, whereas FICM is a measure of the cost of replacing personnel. SRVM accounts for the probability of separation at all future points on the career ladder by using the transition matrix developed for the estimation of FICM. The estimation of SRVM for some selected tenure provides an estimate of the expected value of that future service based on the probabilities of occupying future YOS service states. The estimation of SRVM also employs the same service state definitions as FICM.

The calculation of the value of a service state requires the estimation of a monetary value of the product of pilots in a particular YOS. In a perfectly competitive market for factors of production, a firm will hire labor until the value marginal product (VMP) of the last unit of labor hired equals the cost of the labor unit, e.g., wage (Becker, 1971). Military compensation for pilots is set at a level which may be under, over, or equal to the wage at which the competitive market values pilots' (Saving, Stone, Looper & Taylor, 1985). Periodically, military compensation is increased in an attempt to attain or maintain military and civilian pay comparability. For example,

Table 5. FICM Results for Pilots (with Bonus): Productivity Scenario 1

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs	(11) Difference no bonus vs bonus
1	1.4993	$306,096	$0	$0	$0	$0	$306,096	$306,096	$458,929	$0
2	1.5043	0	62,492	580,279	76,911	0	719,682	1,025,777	1,182,541	0
3	1.5118	0	0	0	106,351	19,287	125,638	1,151,415	1,314,701	0
4	1.5136	0	0	0	27,816	19,287	47,103	1,198,518	1,363,426	0
5	1.5136	0	0	0	0	19,287	19,287	1,217,805	1,382,713	0
6	1.5432	0	0	0	0	19,287	19,287	1,237,092	1,429,417	0
7	1.8218	0	0	0	0	19,287	19,287	1,256,379	1,837,601	61,617
8	2.0198	0	0	0	0	19,287	19,287	1,275,666	2,182,526	123,550
9	2.1826	0	0	0	0	19,287	19,287	1,294,953	2,474,269	171,430
10	2.2925	0	0	0	0	19,287	19,287	1,314,240	2,681,030	200,388
11	2.4944	0	0	0	0	19,287	19,287	1,333,527	2,944,558	211,650
12	2.6530	0	0	0	0	19,287	19,287	1,352,814	3,158,507	218,834
13	2.6890	0	0	0	0	19,287	19,287	1,372,101	3,226,960	215,879
14	2.7492	0	0	0	0	19,287	19,287	1,391,388	3,324,826	214,653
15	2.7906	0	0	0	0	19,287	19,287	1,410,675	3,400,495	211,939
16	2.8363	0	0	0	0	19,287	19,287	1,429,961	3,481,739	209,423
17	2.8807	0	0	0	0	19,287	19,287	1,449,248	3,561,777	206,717
18	2.8987	0	0	0	0	19,287	19,287	1,468,535	3,609,366	202,095
19	2.9882	0	0	0	0	19,287	19,287	1,487,822	3,746,762	202,276
20	4.4074	0	0	0	0	19,287	19,287	1,507,109	5,563,413	289,696
21	5.8014	0	0	0	0	19,287	19,287	1,526,396	7,356,130	373,565
22	6.7764	0	0	0	0	19,287	19,287	1,545,683	8,621,756	429,454
23	7.8699	0	0	0	0	19,287	19,287	1,564,970	10,042,413	491,981
24	9.0669	0	0	0	0	19,287	19,287	1,584,257	11,598,777	560,009
25	10.4362	0	0	0	0	19,287	19,287	1,603,544	13,379,403	637,810
26	12.0813	0	0	0	0	19,287	19,287	1,622,831	15,517,582	731,540
27	15.5735	0	0	0	0	19,287	19,287	1,642,118	20,035,582	935,444
28	23.0218	0	0	0	0	19,287	19,287	1,661,404	29,655,005	1,374,087
29	30.1054	0	0	0	0	19,287	19,287	1,680,691	38,812,541	1,789,209

[a]Undergraduate Pilot Training.

Table 6. FICM for Pilots (with Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs	(11) Difference no bonus vs bonus
1	1.4993	$306,096	$0	$0	$0	$0	$306,096	306,096	458,929	0
2	1.5043	0	62,492	580,279	162,740	0	805,510	1,111,606	1,268,656	0
3	1.5118	0	0	0	318,994	19,287	338,281	1,449,887	1,614,949	0
4	1.5136	0	0	0	198,827	19,287	218,113	1,668,000	1,835,245	0
5	1.5136	0	0	0	88,076	19,287	107,363	1,775,363	1,942,607	0
6	1.5432	0	0	0	20,454	19,287	39,741	1,815,104	2,021,115	0
7	1.8218	0	0	0	3,363	19,287	22,650	1,837,754	2,617,712	61,617
8	2.0198	0	0	0	0	19,287	19,287	1,857,040	3,120,232	123,550
9	2.1826	0	0	0	0	19,287	19,287	1,876,327	3,541,152	171,430
10	2.2925	0	0	0	0	19,287	19,287	1,895,614	3,834,557	200,388
11	2.4944	0	0	0	0	19,287	19,287	1,914,901	4,199,691	211,650
12	2.6530	0	0	0	0	19,287	19,287	1,934,188	4,493,422	218,834
13	2.6890	0	0	0	0	19,287	19,287	1,953,475	4,580,037	215,879
14	2.7492	0	0	0	0	19,287	19,287	1,972,762	4,708,134	214,653
15	2.7906	0	0	0	0	19,287	19,287	1,992,049	4,804,664	211,939
16.	2.8363	0	0	0	0	19,287	19,287	2,011,336	4,908,889	209,423
17	2.8807	0	0	0	0	19,287	19,287	2,030,623	5,011,254	206,717
18	2.8987	0	0	0	0	19,287	19,287	2,049,910	5,067,904	202,095
19	2.9882	0	0	0	0	19,287	19,287	2,069,197	5,250,338	202,276
20	4.4074	0	0	0	0	19,287	19,287	2,088,484	7,781,124	289,696
21	5.8014	0	0	0	0	19,287	19,287	2,107,770	10,275,250	373,565
22	6.7764	0	0	0	0	19,287	19,287	2,127,057	12,031,439	429,454
23	7.8699	0	0	0	0	19,287	19,287	2,146,344	14,002,388	491,981
24	9.0669	0	0	0	0	19,287	19,287	2,165,631	16,161,024	560,009
25	10.4362	0	0	0	0	19,287	19,287	2,184,918	18,630,643	637,810
26	12.0813	0	0	0	0	19,287	19,287	2,204,205	21,596,593	731,540
27	15.5735	0	0	0	0	19,287	19,287	2,223,492	27,871,819	935,444
28	23.0218	0	0	0	0	19,287	19,287	2,242,779	41,238,981	1,374,087
29	30.1054	0	0	0	0	19,287	19,287	2,262,066	53,960,827	1,789,209

[a]Undergraduate Pilot Training.

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there were pay raises in October 1980 and 1981 of 11.7% and 14.3%, respectively. However, these across-the-board pay increases may not be sufficient for high demand career fields such as pilots.

The Air Force uses Selective Reenlistment Bonuses (SRB) to increase the compensation level in those enlisted AFSs which experience chronic manning shortfalls. An SRB program for officer AFSs does not presently exist. Officer career fields which exhibit a chronic history of shortages reflect military compensation levels which are below the civilian VMP of the labor input. Since the Air Force competes directly with the private sector for certain labor skills such as those of experienced pilots, the civilian labor market provides a consistent market evaluation of VMP in the Air Force. For the SRVM analysis of pilots, the wages paid in the commercial airline industry will be used as a measure of the VMP of Air Force pilots in the production of national defense and as the basis for estimating the value of service states.

Two essential components in the estimation of SRVM values are the service state specific values and transition probabilities between service states. The same transition probabilities used for FICM are used in the SRVM estimations. The value of each service state was computed using a simple average of airline pay from the 1985 United Airline contract and the 1987 Future Aviation Professionals of America (FAPA) projection of airline pay (see Appendix C). Military compensation was based on FY88 Regular Military Compensation (RMC) which includes basic pay, basic allowance for quarters (BAQ), basic allowance for subsistence (BAS), and the marginal tax advantage accrued from not taxing BAQ and BAS. The calculation of military compensation was a weighted average of RMC based on the objective force pilot inventory profile for FY88. The values for RMC and pilot inventory were provided by AF/DPXA (see Appendix D). The civilian and military age-earnings functions in Figure 2 show that the Air Force is compensating pilots at a lower rate than the private sector. For a detailed step by step explanation of the SRVM calculation, refer to Appendix B in Stone, Rettenmaier, Saving & Looper (1989).

Table 7 presents SRVM estimates under the assumption that future service tenure extends to voluntary retirement (YOS 20). The SRVM estimate for pilots in general is $437,478 for YOS 7. This means that the Air Force can expect to receive $437,478 worth of value from the services provided by a pilot in YOS 7 whose expected tenure is through YOS 20. SRVM values reach a maximum in YOS 10 as the decreasing length of the horizon to YOS 20 begins to adversely affect the value of SRVM. A slight decline in SRVM values also occurs from YOS 4 through YOS 8 due to the modest change in earnings in the early time periods and the attrition which begins to escalate with the end of the active duty commitment at YOS 7 (see Table 1, Column(2)).

The SRVM values vary by weapon system due only to the difference in the transition probabilities associated with occupying future service states in each weapon system. The lowest SRVM values at YOS 7 are exhibited by SAL, trainers, and tankers which implies that these weapon systems have the highest expected attrition rates beyond YOS 7. The SRVM values tend to converge after YOS 13, producing a difference between the highest and lowest values of only $24,252 at YOS 14 versus $281,562 at YOS 7.

Table 8 provides SRVM estimates of expected future values until YOS 20 and accounts for the effect of the pilot bonus on pilot YOS continuation rates. Column (4) indicates an increase in the SRVM value of a pilot at YOS 7 of $116,385. This increase is caused by the positive impact of the pilot bonus on continuation rates. Since continuation rates beyond YOS 11 are assumed to be unaffected by the pilot bonus, the SRVM values are the same for non-bonus and bonus SRVM values beyond that point. Table 9 emphasizes the impact of the pilot bonus offered at YOS 7. For example, if a pilot in YOS 7 obligates an additional 7 years of military service, then the Air Force can expect to receive $347,542 in value over the next 7 years, as indicated in column 4. At YOS 7, the difference between a non-bonus and bonus SRVM value is $68,154, $1,663 more than the discounted present value of the bonus payments over 7 years.

A bonus analysis by weapon system is not presently provided since the impact of the pilot bonus on attrition by weapon system was not available. SRVM values by weapon system may vary

Civilian and Military Earnings
Pilots
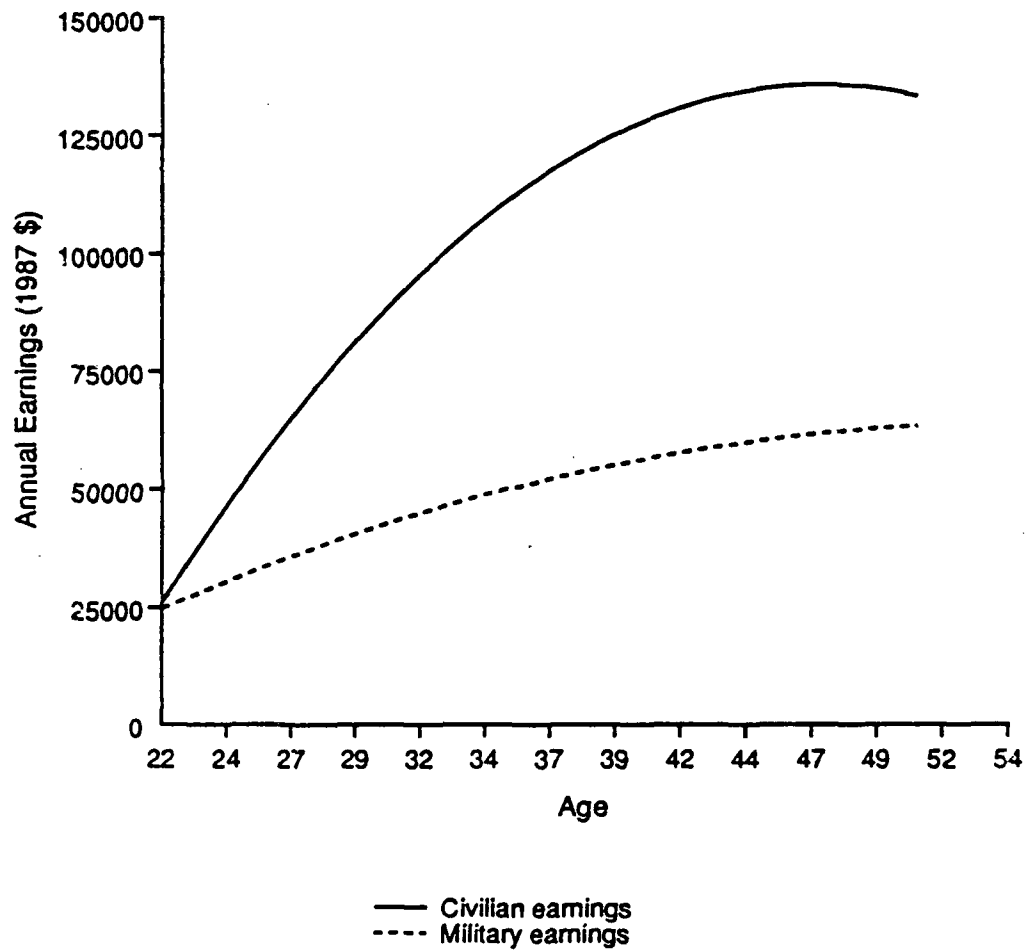
Figure 2. Civilian and Military Earnings - Pilots.

Table 1. SRVM Results by Weapon System (No Bonus): Present Value to Retirement

YOS	Fighter	Trainer	Bomber	Tanker	SAL	TAL	Helo	Aggregate
1	$409,506	$316,425	$406,643	$331,898	$313,323	$364,363	$433,220	$366,244
2	613,479	465,262	608,921	489,900	460,322	541,596	651,241	544,591
3	612,622	454,090	604,835	480,984	450,207	533,329	649,783	538,484
4	614,133	440,498	603,396	468,100	433,463	527,527	645,433	530,095
5	597,321	409,625	589,440	443,052	404,234	502,058	667,030	505,463
6	570,939	376,059	558,161	402,682	367,550	468,464	640,570	468,969
7	537,001	340,468	540,540	358,783	335,642	444,010	617,204	437,478
8	547,904	422,041	581,793	473,847	399,335	498,477	662,309	533,975
9	564,594	584,110	633,979	523,131	510,743	560,344	648,199	593,503
10	591,308	592,141	636,022	574,420	535,256	562,437	614,602	626,940
11	597,960	575,820	599,742	558,995	542,521	576,329	571,135	623,487
12	609,120	566,012	582,441	559,385	570,272	590,671	558,187	622,540
13	593,282	601,935	556,618	570,206	584,782	573,526	567,495	603,800
14	552,721	567,837	543,585	556,181	545,967	549,953	559,086	548,052
15	496,791	510,074	497,957	490,119	487,938	481,640	499,005	487,706
16	418,004	426,782	422,130	412,978	415,797	423,506	426,782	410,860
17	331,664	337,587	337,587	329,696	328,586	336,959	337,587	327,817
18	233,012	234,844	234,844	231,580	232,297	234,177	234,844	229,913
19	124,221	124,221	124,221	124,221	122,531	123,513	124,221	120,507

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Table 8. SRVM Results (with Bonus):
Present Value to Retirement

(1)	(2)	(3)	(4)
YOS	Aggregate no bonus	Aggregate bonus	Difference bonus-no bonus
1	$366,244	$418,777	$52,533
2	544,591	628,242	83,651
3	538,484	627,632	89,149
4	530,095	625,256	95,161
5	505,463	606,654	101,192
6	468,969	576,445	107,476
7	437,478	553,862	116,385
8	533,975	619,280	85,305
9	593,503	640,968	47,465
10	626,940	645,378	18,437
11	623,487	623,487	0
12	622,540	622,540	0
13	603,800	603,800	0
14	548,052	548,052	0
15	487,706	487,706	0
16	410,860	410,860	0
17	327,817	327,817	0
18	229,913	229,913	0
19	120,507	120,507	0

significantly, but as with FICM, an analysis similar to this one for pilots in general must be performed by weapon system to determine whether the pilot bonus on a weapon system basis is economically feasible.

VII. EXPECTED NET PRESENT VALUE CALCULATION

Table 10 presents calculations for ENPVM assuming retention until retirement at YOS 20. For a detailed step by step explanation of the ENPVM calculation, refer to Appendix B in Stone et al. (1989). A pilot at YOS 7 not receiving a bonus has an ENPVM value of $167,508, column 3, which is the value of 13 additional years of service net of all costs to maintain, train, promote, and compensate the pilot. YOS 1 exhibits negative values for ENPVM, with the exception of helicopters and trainers, which are predominately caused by three factors: (a) Since all future value and costs are discounted at a T-bill rate of 6.21%, the large service state values exhibited by trained and experienced pilots in the latter years of service are discounted significantly. For example, $1,000 in YOS 5 is worth $740 to the ENPVM for YOS 1, and $1,000 in YOS 10 is worth only $547 to the ENPVM for YOS 1. Conversely, the value estimated for the service state has increased

Table 9. SRVM Results at 7 Years of Service

(1)	(2)	(3)	(4)	(5)
YOS	Future YOS	SRVM value no bonus	SRVM value bonus	Difference bonus versus no bonus
7	7	$279,388	$347,542	$68,154
7	6	249,978	309,161	59,183
7	5	219,095	268,855	49,760
7	4	184,733	224,010	39,277
7	3	145,633	172,982	27,349
7	2	103,610	119,705	16,095
7	1	53,977	59,942	5,965

approximately 55% from YOS 1 to YOS 10. (b) Since training costs are incurred primarily in the first few service states, the discounting of these future costs has little impact on the negative effect of training costs on the estimate of ENPVM. As indicated by helicopters and trainers, the smaller the initial training costs, the smaller the negative effect on the ENPVM value. (c) The attrition of pilots occurring at each service state continues to increase, causing the probability of attaining a particular service state in the future to decline and, thus, reducing the expected present value of any one future service state. Table 10 presents an analysis of ENPVM values by weapon system in columns 4 through 10. The weapon system with the highest ENPVM value at YOS 7, excluding helicopters and trainers, is TAL with a value $225,986. The lowest ENPVM value at YOS 7 is displayed by fighters which is primarily due to the large simulator costs necessary to maintain 100% flying proficiency. Table 11 presents similar ENPVM estimates for pilots in general and by weapon system using the less conservative productivity scenario 2, which only affects the ENPVM values in YOSs 1 through 6. Since no lost productivity costs are incurred past YOS 7, the calculation of ENPVM is unaffected.

Tables 10 and 11 also present an analysis of ENPVM values with a transition matrix which includes the effect of a pilot bonus program. YOS 7 in Tables 10 and 11, column 2 versus column 3, exhibits an increase in ENPVM of $82, from $167,508 to $167,590, which is due solely to the improvement in attrition beyond YOS 7. The calculation of ENPVM using the bonus transition matrix and the annual $12,000 installments indicates an net gain of $82, in addition to the $167,508 which would be received in the absence of the bonus. Conversely, YOS 8 through 13 exhibit decreases in the bonus affected value of ENPVM, column 2 versus column 3, but the ENPVM is still positive. Though ENPVM has declined for YOS 8 through 13, a higher pilot retention has been achieved, lower total training costs, and the value of ENPVM remains positive.

Table 12 provides additional information on the contribution of the pilot bonus to ENPVM. Comparing column 3 with column 4, for each additional YOS beyond the seventh, the bonus payment reflects a net reduction in the value of ENPVM. In each case presented in Table 12, the ENPVM remains positive with the Air Force receiving the benefits of reduced training costs, not reflected in Table 12, and higher retention of their experienced pilots.

Table 10. ENPVM Results (to Retirement) by Weapon System: Productivity Scenario 1

(1) YOS	(2) Bonus	(3) No Bonus	(4) Bomber	(5) Fighter	(6) Helo	(7) SAL	(8) TAL	(9) Tanker	(10) Trainer
1	$ -436,665	$ -436,702	$ -446,525	$ -984,906	$ 94,987	$ -194,353	$ -3,568	$ -109,127	$ 43,777
2	7,088	7,028	-197,999	-157,231	271,392	-33,808	140,203	110,113	208,375
3	121,716	121,653	53,027	10,046	286,985	155,714	216,628	213,865	222,903
4	163,496	163,428	104,235	49,007	298,666	184,415	240,581	226,122	225,819
5	169,061	168,990	119,729	68,118	318,914	180,847	238,165	221,953	216,937
6	167,966	167,890	128,212	81,859	315,229	172,102	230,277	208,741	205,407
7	167,590	167,508	138,671	93,385	312,164	164,701	225,986	192,760	191,992
8	203,648	214,755	162,698	110,475	342,615	203,247	260,922	261,080	243,784
9	219,085	241,472	181,899	119,523	336,354	261,039	294,220	288,737	337,546
10	230,231	258,588	187,811	131,674	320,652	275,380	296,942	318,254	343,027
11	229,541	257,656	178,932	135,946	297,112	278,343	303,350	308,456	332,049
12	240,861	261,352	179,244	144,962	293,046	295,334	313,504	310,929	328,375
13	246,475	257,622	176,930	147,848	300,635	305,631	307,015	319,208	351,190
14	238,859	238,859	179,360	145,273	299,819	289,044	297,936	314,554	334,193
15	215,018	215,018	168,034	135,051	268,952	259,724	262,203	278,184	300,949
16	182,735	182,735	144,794	116,400	231,006	222,322	231,494	235,165	252,439
17	149,259	149,259	120,123	97,177	185,457	178,445	186,869	190,223	202,005
18	106,295	106,295	85,512	70,407	130,365	127,513	131,201	134,873	141,727
19	57,321	57,321	47,185	39,690	70,287	68,601	70,509	73,588	76,139

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Table 11. ENPVM Results (to Retirement) by Weapon System: Productivity Scenario 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Bonus	No Bonus	Bomber	Fighter	Helo	SAL	TAL	Tanker	Trainer
1	$ -767,514	$ -767,551	$ -1,479,827	$ -1,431,964	$ 72,899	$ -550,213	$ -207,629	$ -604,233	$ -31,979
2	-433,914	-433,973	-1,675,735	-759,053	239,972	-433,088	-109,059	-584,889	109,944
3	-135,626	-135,689	-1,004,447	-332,583	272,956	11,135	74,636	-279,266	182,088
4	59,809	59,741	-483,553	-53,108	296,142	183,330	194,788	-40,514	220,665
5	146,879	146,808	-116,195	66,862	318,914	180,847	237,508	118,714	216,937
6	164,860	164,784	90,885	81,859	315,229	172,102	230,277	194,463	205,407
7	167,590	167,508	138,671	93,385	312,164	164,701	225,986	192,760	191,992
8	203,648	214,755	162,698	110,475	342,615	203,247	260,922	261,080	243,784
9	219,085	241,472	181,899	119,523	336,354	261,039	294,220	288,737	337,546
10	230,231	258,588	187,811	131,674	320,652	275,380	296,942	318,254	343,027
11	229,541	257,656	178,932	135,946	297,112	278,343	303,350	308,456	332,049
12	240,861	261,352	179,244	144,962	293,046	295,334	313,504	310,929	328,375
13	246,475	257,622	176,930	147,848	300,635	305,631	307,015	319,208	351,190
14	238,859	238,859	179,360	145,273	299,819	289,044	297,936	314,554	334,193
15	215,018	215,018	168,034	135,051	268,952	259,724	262,203	278,184	300,949
16	182,735	182,735	144,794	116,400	231,006	222,322	231,494	235,165	252,439
17	149,259	149,259	120,123	97,177	185,457	178,445	186,869	190,223	202,005
18	106,295	106,295	85,512	70,407	130,365	127,513	131,201	134,873	141,727
19	57,321	57,321	47,185	39,690	70,287	68,601	70,509	73,588	76,139

Table 12. ENPVM Results at 7 Years of Service

YOS	Future YOS	ENPVM[a] value no bonus	ENPVM[b] value bonus	Difference bonus versus no bonus
7	7	$98,607	$77,669	$20,938
7	6	87,508	67,701	19,807
7	5	75,827	57,320	18,507
7	4	63,061	46,153	16,908
7	3	47,134	31,715	15,419
7	2	31,671	19,194	12,477
7	1	13,271	5,167	8,104

[a] Net Value = Civilian Sector Wage - (RMC + Flight Pay + Marginal Training Costs).

[b] Net Value = Civilian Sector Wage - (RMC + Flight Pay + Marginal Training Costs + $12,000 Bonus in years 8 - 14).

VIII. SUMMARY AND CONCLUSION

FICM, SRVM, and ENPVM models have been estimated for pilots in general, with and without the affect of the pilot bonus program. Each model provides a different perspective into the relative cost of implementing a pilot bonus program. Comparison of FICM values with and without the affect of the pilot bonus program indicates a replacement cost savings which covers the proposed cost of the bonus. Therefore, FICM values indicate that the Air Force would benefit from the implementation of a program to reduce turnover at YOS 7 level and beyond via a pilot bonus. As Tables 8 and 9 demonstrate, the changes in the expected value of future services, SRVM, due to the implementation of a pilot bonus program are cost effective. Table 12 provides additional support for the cost effectiveness of the pilot bonus program through ENPVM estimates.

Mobility patterns or transition rates affect all three model estimates as indicated in Tables 1 through 12. The implementation of a pilot bonus would increase military compensation relative to its civilian counterpart, decreasing attrition in most YOSs. In turn, pilots are more likely to continue long enough for the Air Force to realize a positive return on the extensive level of training. FICM, SRVM, and ENPVM indicate that the pilot bonus program is a cost effective approach to achieving a positive rate of return on Air Force pilot training.

REFERENCES

Becker, G.S. (1971). Economic theory. New York: Alfred A. Knopf.

Conferees revamp Air Force pilot-bonus plan. (1988, July 25). Air Force Times.

Cost analysis: U.S. Air Force cost and planning factors. (1985, February 1). (Air Force Regulation 173-13). Washington, DC: Department of the Air Force.

Cost analysis: U.S. Air Force cost and planning factors. (1988, March 9). (Air Force Regulation 173-13 (C2)). Washington, DC: Department of the Air Force.

Flamholtz, E. (1985). Human resource accounting. San Francisco: Jossey-Bass Publishers, Inc.

Flamholtz, E., Geis, G., & Perle, R. (1986, April). A Markovian model for the valuation of human assets acquired by an organizational purchase: Application in a Securities Brokerage. Paper presented at the joint national meeting of TIMS/ORSA, Los Angeles, CA.

Flamholtz, E., & Lundy, T. (1975, October). Human resource accounting for CPA firms. The CPA.

Flamholtz, E., & Searfoss, G. (1985). Developing a Human Resource Accounting System as a Human Resource Decision Support System. Forthcoming in Accounting, Organizations and Society.

FY88 cost factors. (1986, May). Randolph AFB, TX: Director of Cost DCS, Comptroller, HQ/ATC.

Pilot retention rate drops below 50% in '87. (1987, November 16). Air Force Times.

Quarterly Officer Retention Report. (1988, June). Randolph AFB, TX: USAF Officer Retention Branch, Headquarters Air Force Military Personnel Center.

Saving, T.R., Stone, B.M., Looper, L.T., & Taylor, J.N. (1985, July). Retention of Air Force enlisted personnel: An empirical examination (AFHRL-TP-85-6, AD-A158 091). Brooks AFB: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Stone, B.M., Rettenmaier, A.J., Saving, T.R., & Looper, L.T. (1989). Cost-based value models of Air Force experience. (AFHRL-TR-89-20). Brooks AFB, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

$12,000 annual bonus studied for pilots who stay on duty. (1988, January 11). Air Force Times.

APPENDIX A: FICM RESULTS BY WEAPON SYSTEM: PRODUCTIVITY SCENARIO 1

Table A-1. FICM Results for Bomber Pilots (No Bonus): Productivity Scenario 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
1	1.4993	$ 306,106	$	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
2	1.4993	0	0	382,934	147,363	0	530,297	836,402	989,226
3	1.5126	0	0	0	242,868	31,929	274,797	1,111,199	1,275,309
4	1.5287	0	0	0	29,018	31,929	60,947	1,172,146	1,350,471
5	1.5287	0	0	0	0	31,929	31,929	1,204,075	1,382,400
6	1.5754	0	0	0	0	31,929	31,929	1,236,004	1,457,514
7	1.8028	0	0	0	0	31,929	31,929	1,267,933	1,704,415
8	2.1072	0	0	0	0	31,929	31,929	1,299,862	2,029,493
9	2.2729	0	0	0	0	31,929	31,929	1,331,791	2,223,556
10	2.3425	0	0	0	0	31,929	31,929	1,363,720	2,324,530
11	2.5022	0	0	0	0	31,929	31,929	1,395,649	2,517,127
12	2.6538	0	0	0	0	31,929	31,929	1,427,578	2,703,545
13	2.8979	0	0	0	0	31,929	31,929	1,459,507	2,987,011
14	3.0385	0	0	0	0	31,929	31,929	1,491,436	3,165,491
15	3.0856	0	0	0	0	31,929	31,929	1,523,365	3,246,992
16	3.1195	0	0	0	0	31,929	31,929	1,555,294	3,314,953
17	3.1195	0	0	0	0	31,929	31,929	1,587,223	3,346,883
18	3.1195	0	0	0	0	31,929	31,929	1,619,153	3,378,812
19	3.1195	0	0	0	0	31,929	31,929	1,651,082	3,410,741
20	4.1047	0	0	0	0	31,929	31,929	1,683,011	4,529,828
21	6.2679	0	0	0	0	31,929	31,929	1,714,940	6,965,927
22	8.0016	0	0	0	0	31,929	31,929	1,746,869	8,933,433
23	10.1197	0	0	0	0	31,929	31,929	1,778,798	11,338,546
24	11.9055	0	0	0	0	31,929	31,929	1,810,727	13,377,030
25	13.8898	0	0	0	0	31,929	31,929	1,842,656	15,643,785
26	17.6779	0	0	0	0	31,929	31,929	1,874,585	19,950,909
27	22.4991	0	0	0	0	31,929	31,929	1,906,514	25,432,703
28	44.9982	0	0	0	0	31,929	31,929	1,938,443	50,929,265
29	56.8398	0	0	0	0	31,929	31,929	1,970,372	64,372,035

[a] Undergraduate Pilot Training.

Table A-2. FICM Results for Fighter Pilots (No Bonus): Productivity Scenario 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
01	1.4993	$306,106	$ 0	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
02	1.5061	0	157,743	1,172,368	98,247	0	1,428,358	1,734,464	1,895,905
03	1.5250	0	0	0	149,381	39,889	189,270	1,923,734	2,111,305
04	1.5326	0	0	0	11,848	39,889	51,736	1,975,470	2,173,884
05	1.5433	0	0	0	0	39,889	39,889	2,015,359	2,229,182
06	1.5458	0	0	0	0	39,889	39,889	2,055,248	2,272,796
07	1.6887	0	0	0	0	39,889	39,889	2,095,136	2,526,462
08	1.8945	0	0	0	0	39,889	39,889	2,135,025	2,879,033
09	2.1533	0	0	0	0	39,889	39,889	2,174,914	3,317,681
10	2.3809	0	0	0	0	39,889	39,889	2,214,802	3,712,600
11	2.6509	0	0	0	0	39,889	39,889	2,254,691	4,177,916
12	2.8386	0	0	0	0	39,889	39,889	2,294,579	4,516,516
13	2.9491	0	0	0	0	39,889	39,889	2,334,468	4,733,750
14	3.0353	0	0	0	0	39,889	39,889	2,374,357	4,913,218
15	3.0660	0	0	0	0	39,889	39,889	2,414,245	5,003,138
16	3.0895	0	0	0	0	39,889	39,889	2,454,134	5,081,622
17	3.1287	0	0	0	0	39,889	39,889	2,494,023	5,186,504
18	3.1534	0	0	0	0	39,889	39,889	2,533,911	5,267,654
19	3.1534	0	0	0	0	39,889	39,889	2,573,800	5,307,542
20	4.1372	0	0	0	0	39,889	39,889	2,613,688	7,015,829
21	5.6355	0	0	0	0	39,889	39,889	2,653,577	9,610,875
22	6.4535	0	0	0	0	39,889	39,889	2,693,466	11,051,681
23	7.6961	0	0	0	0	39,889	39,889	2,733,354	13,227,213
24	9.3988	0	0	0	0	39,889	39,889	2,773,243	16,202,302
25	11.2608	0	0	0	0	39,889	39,889	2,813,132	19,459,983
26	13.1695	0	0	0	0	39,889	39,889	2,853,020	22,804,934
27	16.4112	0	0	0	0	39,889	39,889	2,892,909	28,468,164
28	25.0994	0	0	0	0	39,889	39,889	2,932,798	43,600,551
29	35.4345	0	0	0	0	39,889	39,889	2,972,686	61,610,032

[a] Undergraduate Pilot Training.

Table A-3. FICM Results for Helicoptor Pilots (No Bonus): Productivity Scenario 1

(1) YOS	(2) Replacement number	(3) UPI[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
01	1.4993	$306,106	0	$ 0	$ 0	$ 0	$306,106	$306,106	$ 458,929
02	1.4993	0	0	132,280	5,129	0	137,409	443,514	596,338
03	1.4993	0	0	0	2,821	7,392	10,214	453,728	606,551
04	1.5862	0	0	0	0	7,392	7,392	461,120	649,534
05	1.5862	0	0	0	0	7,392	7,392	468,512	656,927
06	1.6030	0	0	0	0	7,392	7,392	475,905	671,386
07	1.8034	0	0	0	0	7,392	7,392	483,297	763,626
08	1.8880	0	0	0	0	7,392	7,392	490,689	807,159
09	1.9329	0	0	0	0	7,392	7,392	498,081	833,946
10	1.9768	0	0	0	0	7,392	7,392	505,474	860,459
11	2.1382	0	0	0	0	7,392	7,392	512,866	938,697
12	2.4055	0	0	0	0	7,392	7,392	520,258	1,064,350
13	2.6383	0	0	0	0	7,392	7,392	527,650	1,175,459
14	2.6944	0	0	0	0	7,392	7,392	535,043	1,208,019
15	2.7543	0	0	0	0	7,392	7,392	542,435	1,242,420
16	2.7543	0	0	0	0	7,392	7,392	549,827	1,249,812
17	2.7543	0	0	0	0	7,392	7,392	557,220	1,257,205
18	2.7543	0	0	0	0	7,392	7,392	564,612	1,264,597
19	2.7543	0	0	0	0	7,392	7,392	572,004	1,271,989
20	3.6306	0	0	0	0	7,392	7,392	579,396	1,686,457
21	4.8162	0	0	0	0	7,392	7,392	586,789	2,246,943
22	6.5160	0	0	0	0	7,392	7,392	594,181	3,049,983
23	7.2826	0	0	0	0	7,392	7,392	601,573	3,417,067
24	8.3229	0	0	0	0	7,392	7,392	608,965	3,913,667
25	8.8778	0	0	0	0	7,392	7,392	616,358	4,182,464
26	10.1461	0	0	0	0	7,392	7,392	623,750	4,788,407
27	15.2191	0	0	0	0	7,392	7,392	631,142	7,193,699
28	26.6334	0	0	0	0	7,392	7,392	638,535	12,601,909
29	26.6334	0	0	0	0	7,392	7,392	645,927	12,609,301

[a] Undergraduate Pilot Training.

Table A-4. FICM Results for SAL Pilots (No Bonus): Productivity Scenario 1

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
01	1.4993	$306,106	$	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
02	1.5090	0	0	135,392	157,549	0	292,941	599,047	756,784
03	1.5090	0	0	0	195,154	8,178	203,331	802,378	960,116
04	1.5158	0	0	0	24,386	8,178	32,563	834,941	997,130
05	1.5374	0	0	0	0	8,178	8,178	843,119	1,019,601
06	1.5989	0	0	0	0	8,178	8,178	851,297	1,068,890
07	2.1281	0	0	0	0	8,178	8,178	859,474	1,433,614
08	3.0055	0	0	0	0	8,178	8,178	867,652	2,036,215
09	3.4658	0	0	0	0	8,178	8,178	875,829	2,357,498
10	3.8957	0	0	0	0	8,178	8,178	884,007	2,659,092
11	4.5177	0	0	0	0	8,178	8,178	892,185	3,093,137
12	5.1033	0	0	0	0	8,178	8,178	900,362	3,503,337
13	5.3236	0	0	0	0	8,178	8,178	908,540	3,663,090
14	5.4656	0	0	0	0	8,178	8,178	916,717	3,769,168
15	5.5978	0	0	0	0	8,178	8,178	924,895	3,868,733
16	5.6314	0	0	0	0	8,178	8,178	933,073	3,900,126
17	5.7445	0	0	0	0	8,178	8,173	941,250	3,986,863
18	5.7685	0	0	0	0	8,178	8,178	949,428	4,011,686
19	5.8482	0	0	0	0	8,178	8,178	957,605	4,075,438
20	8.7293	0	0	0	0	8,178	8,178	965,783	6,095,397
21	12.5664	0	0	0	0	8,178	8,178	973,961	8,786,464
22	15.3589	0	0	0	0	8,178	8,178	982,138	10,749,006
23	18.1515	0	0	0	0	8,178	8,178	990,316	12,713,036
24	21.6809	0	0	0	0	8,178	8,178	998,493	15,194,783
25	26.9547	0	0	0	0	8,178	8,178	1,006,671	18,900,978
26	35.3780	0	0	0	0	8,178	8,178	1,014,849	24,818,266
27	42.4536	0	0	0	0	8,178	8,178	1,023,026	29,791,732
28	67.5399	0	0	0	0	8,178	8,178	1,031,204	47,408,948
29	92.8673	0	0	0	0	8,178	8,178	1,039,382	65,198,548

[a] Undergraduate Pilot Training.

Table A-5. FICM Results for TAL Pilots (No Bonus): Productivity Scenario 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
1	1.4993	$306,106	$	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
2	1.4993	0		95,153	68,002	0	163,155	469,261	622,084
3	1.5145	0		0	72,466	6,727	79,193	548,454	708,433
4	1.5145	0		0	14,958	6,727	21,685	570,139	730,118
5	1.5234	0		0	0	6,727	6,727	576,866	741,130
6	1.5749	0		0	0	6,727	6,727	583,594	773,147
7	1.9157	0		0	0	6,727	6,727	590,321	948,653
8	2.3467	0		0	0	6,727	6,727	597,048	1,170,341
9	2.5738	0		0	0	6,727	6,727	603,776	1,290,978
10	2.8989	0		0	0	6,727	6,727	610,503	1,461,626
11	3.2613	0		0	0	6,727	6,727	617,230	1,651,897
12	3.4985	0		0	0	6,727	6,727	623,957	1,779,252
13	3.7440	0		0	0	6,727	6,727	630,685	1,911,311
14	3.7757	0		0	0	6,727	6,727	637,412	1,934,292
15	3.9745	0		0	0	6,727	6,727	644,139	2,043,179
16	3.9998	0		0	0	6,727	6,727	650,867	2,062,963
17	3.9998	0		0	0	6,727	6,727	657,594	2,069,690
18	3.9998	0		0	0	6,727	6,727	664,321	2,076,417
19	4.0229	0		0	0	6,727	6,727	671,048	2,095,186
20	5.5554	0		0	0	6,727	6,727	677,776	2,902,642
21	7.7439	0		0	0	6,727	6,727	684,503	4,055,484
22	8.4994	0		0	0	6,727	6,727	691,230	4,458,525
23	10.1993	0		0	0	6,727	6,727	697,957	5,358,303
24	12.4942	0		0	0	6,727	6,727	704,685	6,572,162
25	14.0560	0		0	0	6,727	6,727	711,412	7,401,250
26	17.7001	0		0	0	6,727	6,727	718,139	9,328,564
27	21.9144	0		0	0	6,727	6,727	724,867	11,557,980
28	27.6312	0		0	0	6,727	6,727	731,594	14,581,587
29	35.5258	0		0	0	6,727	6,727	738,321	18,756,404

[a] Undergraduate Pilot Training.

Table A-6. FICM Results for Tanker Pilots (No Bonus): Productivity Scenario 1

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,106	$	$	$0	$0	$306,106	$306,106	$458,929
2	1.5066	0	0	221,677	79,474	0	301,151	607,257	763,788
3	1.5124	0	0	0	103,926	3,886	107,813	715,070	874,966
4	1.5249	0	0	0	7,756	3,886	11,642	726,712	893,966
5	1.5249	0	0	0	0	3,886	3,886	730,599	897,853
6	1.5302	0	0	0	0	3,886	3,886	734,485	904,838
7	2.2047	0	0	0	0	3,886	3,886	738,371	1,309,280
8	2.6780	0	0	0	0	3,886	3,886	742,258	1,595,135
9	3.2036	0	0	0	0	3,886	3,886	746,144	1,912,848
10	3.4418	0	0	0	0	3,886	3,886	750,030	2,059,194
11	3.8105	0	0	0	0	3,886	3,886	753,917	2,284,125
12	4.2949	0	0	0	0	3,886	3,886	757,803	2,578,860
13	4.6671	0	0	0	0	3,886	3,886	761,689	2,806,584
14	4.7211	0	0	0	0	3,886	3,886	765,576	2,842,962
15	4.7880	0	0	0	0	3,886	3,886	769,462	2,887,229
16	4.8617	0	0	0	0	3,886.	3,886	773,348	2,935,594
17	4.9329	0	0	0	0	3,886	3,886	777,235	2,982,497
18	5.0023	0	0	0	0	3,886	3,886	781,121	3,028,445
19	5.0023	0	0	0	0	3,886	3,886	785,008	3,032,331
20	7.2311	0	0	0	0	3,886	3,886	788,894	4,388,988
21	10.3064	0	0	0	0	3,886	3,886	792,780	6,261,108
22	13.1922	0	0	0	0	3,886	3,886	796,667	8,019,193
23	16.9025	0	0	0	0	3,886	3,886	800,553	10,279,571
24	21.5122	0	0	0	0	3,886	3,886	804,439	13,088,036
25	24.1357	0	0	0	0	3,886	3,886	808,326	14,688,499
26	38.6171	0	0	0	0	3,886	3,886	812,212	23,507,816
27	54.0639	0	0	0	0	3,886	3,886	816,098	32,916,384
28	78.0924	0	0	0	0	3,886	3,886	819,985	47,551,501
29	117.1385	0	0	0	0	3,886	3,886	823,871	71,333,081

[a] Undergraduate Pilot Training.

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Table A-7 FICM Results for Trainer Pilots (No Bonus): Productivity Scenario 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
1	1.4993	$306,106	$	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
2	1.5049	0	0	138,934	17,003	0	155,937	462,043	617,177
3	1.5140	0	0	0	11,065	1,177	12,241	474,284	633,222
4	1.5140	0	0	0	0	1,177	1,177	475,461	634,399
5	1.5449	0	0	0	0	1,177	1,177	476,637	648,546
6	1.5890	0	0	0	0	1,177	1,177	477,814	668,286
7	2.1849	0	0	0	0	1,177	1,177	478,991	920,512
8	3.2773	0	0	0	0	1,177	1,177	480,167	1,382,533
9	3.6051	0	0	0	0	1,177	1,177	481,344	1,522,080
10	3.8537	0	0	0	0	1,177	1,177	482,521	1,628,309
11	4.1840	0	0	0	0	1,177	1,177	483,697	1,769,156
12	4.8814	0	0	0	0	1,177	1,177	484,874	2,065,388
13	5.1138	0	0	0	0	1,177	1,177	486,050	2,164,972
14	5.2356	0	0	0	0	1,177	1,177	487,227	2,217,724
15	5.2356	0	0	0	0	1,177	1,177	488,404	2,218,901
16	5.2356	0	0	0	0	1,177	1,177	489,580	2,220,077
17	5.2356	0	0	0	0	1,177	1,177	490,757	2,221,254
18	5.2356	0	0	0	0	1,177	1,177	491,934	2,222,430
19	5.2356	0	0	0	0	1,177	1,177	493,110	2,223,607
20	6.6799	0	0	0	0	1,177	1,177	494,287	2,838,517
21	9.7162	0	0	0	0	1,177	1,177	495,464	4,130,464
22	10.7389	0	0	0	0	1,177	1,177	496,640	4,566,550
23	16.1084	0	0	0	0	1,177	1,177	497,817	6,851,590
24	17.3475	0	0	0	0	1,177	1,177	498,994	7,379,902
25	20.2387	0	0	0	0	1,177	1,177	500,170	8,611,259
26	20.2387	0	0	0	0	1,177	1,177	501,347	8,612,436
27	24.2865	0	0	0	0	1,177	1,177	502,524	10,336,335

[a] Undergraduate Pilot Training.

APPENDIX B: FICM RESULTS BY WEAPON SYSTEM: PRODUCTIVITY SCENARIO 2

Table B-1. FICM Results for Bomber Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,106	$	$	$0	$0	$ 306,106	$ 306,106	$ 458,929
2	1.4993	0	0	382,934	315,010	0	697,944	1,004,050	1,156,873
3	1.5126	0	0	0	754,897	31,929	786,826	1,790,876	1,961,053
4	1.5287	0	0	0	574,345	31,929	606,274	2,397,150	2,594,640
5	1.5287	0	0	0	394,990	31,929	426,919	2,824,069	3,021,559
6	1.5754	0	0	0	213,248	31,929	245,177	3,069,246	3,366,484
7	1.8028	0	0	0	40,854	31,929	72,783	3,142,029	3,935,655
8	2.1072	0	0	0	0	31,929	31,929	3,173,958	4,637,436
9	2.2729	0	0	0	0	31,929	31,929	3,205,887	5,036,619
10	2.3425	0	0	0	0	31,929	31,929	3,237,816	5,223,708
11	2.5022	0	0	0	0	31,929	31,929	3,269,745	5,613,976
12	2.6538	0	0	0	0	31,929	31,929	3,301,674	5,988,081
13	2.8979	0	0	0	0	31,929	31,929	3,333,603	6,573,574
14	3.0385	0	0	0	0	31,929	31,929	3,365,532	6,926,158
15	3.0856	0	0	0	0	31,929	31,929	3,397,461	7,065,965
16	3.1195	0	0	0	0	31,929	31,929	3,429,390	7,175,892
17	3.1195	0	0	0	0	31,929	31,929	3,461,319	7,207,822
18	3.1195	0	0	0	0	31,929	31,929	3,493,248	7,239,751
19	3.1195	0	0	0	0	31,929	31,929	3,525,177	7,271,680
20	4.1047	0	0	0	0	31,929	31,929	3,557,107	9,610,011
21	6.2679	0	0	0	0	31,929	31,929	3,589,036	14,723,504
22	8.0016	0	0	0	0	31,929	31,929	3,620,965	18,836,723
23	10.1197	0	0	0	0	31,929	31,929	3,652,894	23,863,295
24	11.9055	0	0	0	0	31,929	31,929	3,684,823	28,112,028
25	13.8898	0	0	0	0	31,929	31,929	3,716,752	32,834,616
26	17.6779	0	0	0	0	31,929	31,929	3,748,681	41,830,149
27	22.4991	0	0	0	0	31,929	31,929	3,780,610	53,279,008
28	44.9982	0	0	0	0	31,929	31,929	3,812,539	106,621,874
29	56.8398	0	0	0	0	31,929	31,929	3,844,468	134,720,593

[a] Undergraduate Pilot Training.

Table B-2. FICM Results for Fighter Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
01	1.4993	$306,106	$0	$0	$0	$0	$306,106	$306,106	$458,929
02	1.5061	0	157,743	1,172,368	208,298	0	1,538,410	1,844,515	2,006,459
03	1.5250	0	0	0	448,837	39,889	488,726	2,333,241	2,526,453
04	1.5326	0	0	0	278,207	39,889	318,096	2,651,337	2,858,807
05	1.5433	0	0	0	107,745	39,889	147,634	2,798,970	3,027,367
06	1.5458	0	0	0	1,345	39,889	41,233	2,840,203	3,073,639
07	1.6887	0	0	0	0	39,889	39,889	2,880,092	3,401,332
08	1.8945	0	0	0	0	39,889	39,889	2,919,981	3,860,496
09	2.1533	0	0	0	0	39,889	39,889	2,959,869	4,433,224
10	2.3809	0	0	0	0	39,889	39,889	2,999,758	4,946,101
11	2.6509	0	0	0	0	39,889	39,889	3,039,647	5,551,261
12	2.8386	0	0	0	0	39,889	39,889	3,079,535	5,987,124
13	2.9491	0	0	0	0	39,889	39,889	3,119,424	6,261,597
14	3.0353	0	0	0	0	39,889	39,889	3,159,312	6,485,739
15	3.0660	0	0	0	0	39,889	39,889	3,199,201	6,591,543
16	3.0895	0	0	0	0	39,889	39,889	3,239,090	6,682,183
17	3.1287	0	0	0	0	39,889	39,889	3,278,978	6,807,377
18	3.1534	0	0	0	0	39,889	39,889	3,318,867	6,901,323
19	3.1534	0	0	0	0	39,889	39,889	3,358,756	6,941,211
20	4.1372	0	0	0	0	39,889	39,889	3,398,644	9,159,203
21	5.6355	0	0	0	0	39,889	39,889	3,438,533	12,530,450
22	6.4535	0	0	0	0	39,889	39,889	3,478,422	14,395,066
23	7.6961	0	0	0	0	39,889	39,889	3,518,310	17,214,355
24	9.3988	0	0	0	0	39,889	39,889	3,558,199	21,071,555
25	11.2608	0	0	0	0	39,889	39,889	3,598,087	25,293,899
26	13.1695	0	0	0	0	39,889	39,889	3,637,976	29,627,650
27	16.4112	0	0	0	0	39,889	39,889	3,677,865	36,970,317
28	25.0994	0	0	0	0	39,889	39,889	3,717,753	56,603,844
29	35.4345	0	0	0	0	39,889	39,889	3,757,642	79,967,623

[a] Undergraduate Pilot Training.

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Table B-3. FICM Results for Helicopter Pilots (No Bonus): Productivity Scenario 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
01	1.4993	$306,106	$0	$0	$0	$0	$306,106	$306,106	$458,929
02	1.4993	0	0	132,280	8,880	0	141,160	447,266	600,089
03	1.4993	0	0	0	22,165	7,392	29,557	476,823	629,647
04	1.5862	0	0	0	12,375	7,392	19,767	496,590	687,061
05	1.5862	0	0	0	2,837	7,392	10,229	506,819	697,290
06	1.6030	0	0	0	0	7,392	7,392	514,212	712,179
07	1.8034	0	0	0	0	7,392	7,392	521,604	809,517
08	1.8880	0	0	0	0	7,392	7,392	528,996	855,202
09	1.9329	0	0	0	0	7,392	7,392	536,388	883,133
10	1.9768	0	0	0	0	7,392	7,392	543,781	910,764
11	2.1382	0	0	0	0	7,392	7,392	551,173	993,108
12	2.4055	0	0	0	0	7,392	7,392	558,565	1,125,563
13	2.6383	0	0	0	0	7,392	7,392	565,957	1,242,596
14	2.6944	0	0	0	0	7,392	7,392	573,350	1,276,583
15	2.7543	0	0	0	0	7,392	7,392	580,742	1,312,508
16	2.7543	0	0	0	0	7,392	7,392	588,134	1,319,901
17	2.7543	0	0	0	0	7,392	7,392	595,527	1,327,293
18	2.7543	0	0	0	0	7,392	7,392	602,919	1,334,685
19	2.7543	0	0	0	0	7,392	7,392	610,311	1,342,078
20	3.6306	0	0	0	0	7,392	7,392	617,703	1,778,847
21	4.8162	0	0	0	0	7,392	7,392	625,096	2,369,501
22	6.5160	0	0	0	0	7,392	7,392	632,488	3,215,796
23	7.2826	0	0	0	0	7,392	7,392	639,880	3,602,387
24	8.3229	0	0	0	0	7,392	7,392	647,272	4,125,462
25	8.8778	0	0	0	0	7,392	7,392	654,665	4,408,378
26	10.1461	0	0	0	0	7,392	7,392	662,057	5,046,595
27	15.2191	0	0	0	0	7,392	7,392	669,449	7,580,980
28	26.6334	0	0	0	0	7,392	7,392	676,842	13,279,652
29	26.6334	0	0	0	0	7,392	7,392	684,234	13,287,044

[a]Undergraduate Pilot Training.

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Table B-4. FICM Results for SAL Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
01	1.4993	$306,106	$	$ 0	$ 0	$ 0	306,106	$ 306,106	$ 458,929
02	1.5090	0	0	135,392	324,922	0	460,315	766,420	925,252
03	1.5090	0	0	0	477,425	8,178	485,602	1,252,022	1,410,854
04	1.5158	0	0	0	176,858	8,178	185,036	1,437,058	1,603,046
05	1.5374	0	0	0	1,157	8,178	9,335	1,446,393	1,635,306
06	1.5989	0	0	0	0	8,178	8,178	1,454,571	1,709,223
07	2.1281	0	0	0	0	8,178	8,178	1,462,749	2,285,920
08	3.0055	0	0	0	0	8,178	8,178	1,470,926	3,239,909
09	3.4658	0	0	0	0	8,178	8,178	1,479,104	3,745,541
10	3.8957	0	0	0	0	8,178	8,178	1,487,281	4,219,297
11	4.5177	0	0	0	0	8,178	8,178	1,495,459	4,902,449
12	5.1033	0	0	0	0	8,178	8,178	1,503,637	5,547,189
13	5.3236	0	0	0	0	8,178	8,178	1,511,814	5,795,167
14	5.4656	0	0	0	0	8,178	8,178	1,519,992	5,958,101
15	5.5978	0	0	0	0	8,178	8,178	1,528,169	6,110,624
16	5.6314	0	0	0	0	8,178	8,178	1,536,347	6,155,441
17	5.7445	0	0	0	0	8,178	8,178	1,544,525	6,287,510
18	5.7685	0	0	0	0	8,178	8,178	1,552,702	6,321,920
19	5.8482	0	0	0	0	8,178	8,178	1,560,880	6,417,610
20	8.7293	0	0	0	0	8,178	8,178	1,569,057	9,591,433
21	12.5664	0	0	0	0	8,178	8,178	1,577,235	13,819,220
22	15.3589	0	0	0	0	8,178	8,178	1,585,413	16,900,153
23	18.1515	0	0	0	0	8,178	8,178	1,593,590	19,982,572
24	21.6809	0	0	0	0	8,178	8,178	1,601,768	23,877,840
25	26.9547	0	0	0	0	8,178	8,178	1,609,946	29,696,130
26	35.3780	0	0	0	0	8,178	8,178	1,618,123	38,986,904
27	42.4536	0	0	0	0	8,178	8,178	1,626,301	46,794,098
28	67.5399	0	0	0	0	8,178	8,178	1,634,478	74,458,166
29	92.8673	0	0	0	0	8,178	8,178	1,642,656	102,391,223

[a]Undergraduate Pilot Training.

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Table B-5. FICM Results for TAL Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,106	$	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
2	1.4993	0	0	95,153	143,678	0	238,831	544,937	697,760
3	1.5145	0	0	0	195,215	6,727	201,942	746,879	908,883
4	1.5145	0	0	0	121,513	6,727	128,240	876,120	1,037,124
5	1.5234	0	0	0	47,980	6,727	54,707	929,827	1,098,179
6	1.5749	0	0	0	702	6,727	7,429	937,256	1,142,996
7	1.9157	0	0	0	0	6,727	6,727	943,983	1,398,544
8	2.3467	0	0	0	0	6,727	6,727	956,711	1,721,457
9	2.5738	0	0	0	0	6,727	6,727	957,438	1,895,428
10	2.8989	0	0	0	0	6,727	6,727	964,165	2,142,427
11	3.2613	0	0	0	0	6,727	6,727	970,892	2,417,799
12	3.4985	0	0	0	0	6,727	6,727	977,620	2,600,855
13	3.7440	0	0	0	0	6,727	6,727	984,347	2,790,571
14	3.7757	0	0	0	0	6,727	6,727	991,074	2,821,004
15	3.9745	0	0	0	0	6,727	6,727	997,802	2,976,559
16	3.9998	0	0	0	0	6,727	6,727	1,004,529	3,002,288
17	3.9998	0	0	0	0	6,727	6,727	1,011,256	3,009,015
18	3.9998	0	0	0	0	6,727	6,727	1,017,983	3,015,743
19	4.0229	0	0	0	0	6,727	6,727	1,024,711	3,039,941
20	5.5554	0	0	0	0	6,727	6,727	1,031,438	4,207,304
21	7.7439	0	0	0	0	6,727	6,727	1,038,165	5,874,104
22	8.4994	0	0	0	0	6,727	6,727	1,044,392	6,454,570
23	10.1993	0	0	0	0	6,727	6,727	1,051,620	7,753,557
24	12.4942	0	0	0	0	6,727	6,727	1,058,347	9,506,349
25	14.0560	0	0	0	0	6,727	6,727	1,065,074	10,702,210
26	17.7001	0	0	0	0	6,727	6,727	1,071,802	13,485,329
27	21.9144	0	0	0	0	6,727	6,727	1,078,529	16,704,451
28	27.6312	0	0	0	0	6,727	6,727	1,085,256	21,070,615
29	35.5258	0	0	0	0	6,727	6,727	1,091,983	27,099,441

[a]Undergraduate Pilot Training.

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Table B-6. FICM Results for Tanker Pilots (No Bonus): Productivity Scenario 2

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
YOS	Replacement number	UPT[a]	Lead-in training	Other training	Lost productivity costs	Simulator costs	Service state costs	Individual replacement costs	Full investment costs
01	1.4993	$306,106	$ 0	$ 0	$ 0	$ 0	$ 306,106	$ 306,106	$ 458,929
02	1.5066	0	0	221,677	172,857	0	394,534	700,640	857,626
03	1.5124	0	0	0	352,592	3,886	356,479	1,057,118	1,218,792
04	1.5249	0	0	0	266,872	3,886	270,758	1,327,877	1,501,912
05	1.5249	0	0	0	182,296	3,886	186,182	1,514,059	1,688,094
06	1.5302	0	0	0	95,372	3,886	99,258	1,613,317	1,793,494
07	2.2047	0	0	0	15,216	3,886	19,103	1,632,419	2,611,570
08	2.6780	0	0	0	0	3,886	3,886	1,636,305	3,177,058
09	3.2036	0	0	0	0	3,886	3,886	1,640,192	3,805,242
10	3.4418	0	0	0	0	3,886	3,886	1,644,078	4,092,239
11	3.8105	0	0	0	0	3,886	3,886	1,647,965	4,534,996
12	4.2949	0	0	0	0	3,886	3,886	1,651,851	5,115,859
13	4.6671	0	0	0	0	3,886	3,886	1,655,737	5,563,457
14	4.7211	0	0	0	0	3,886	3,886	1,659,624	5,631,705
15	4.7880	0	0	0	0	3,886	3,886	1,663,510	5,715,529
16	4.8617	0	0	0	0	3,886	3,886	1,667,396	5,807,406
17	4.9329	0	0	0	0	3,886	3,886	1,671,283	5,896,336
18	5.0023	0	0	0	0	3,886	3,886	1,675,169	5,983,324
19	5.0023	0	0	0	0	3,886	3,886	1,679,055	5,987,211
20	7.2311	0	0	0	0	3,886	3,886	1,682,942	8,660,397
21	10.3064	0	0	0	0	3,886	3,886	1,686,828	12,349,094
22	13.1922	0	0	0	0	3,886	3,886	1,690,714	15,811,815
23	16.9025	0	0	0	0	3,886	3,886	1,694,601	20,263,867
24	21.5122	0	0	0	0	3,886	3,886	1,698,487	25,795,323
25	24.1357	0	0	0	0	3,886	3,886	1,702,373	28,945,454
26	38.6171	0	0	0	0	3,886	3,886	1,706,260	46,318,945
27	54.0639	0	0	0	0	3,886	3,886	1,710,146	64,851,964
28	78.0924	0	0	0	0	3,886	3,886	1,714,033	93,680,673
29	117.1385	0	0	0	0	3,886	3,886	1,717,919	140,526,839

[a]Undergraduate Pilot Training.

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Table B-7. FICM Results for Trainer Pilots (No Bonus): Productivity Scenario 2

(1) YOS	(2) Replacement number	(3) UPT[a]	(4) Lead-in training	(5) Other training	(6) Lost productivity costs	(7) Simulator costs	(8) Service state costs	(9) Individual replacement costs	(10) Full investment costs
1	1.4993	$306,106	$0	$0	$0	$0	$306,106	$306,106	$458,929
2	1.5049	0	0	138,934	39,202	0	178,136	484,242	639,460
3	1.5140	0	0	0	75,181	1,177	76,358	560,600	720,144
4	1.5140	0	0	0	38,457	1,177	39,634	600,234	759,777
5	1.5449	0	0	0	5,475	1,177	6,651	606,885	782,070
6	1.5890	0	0	0	0	1,177	1,177	608,062	805,625
7	2.1849	0	0	0	0	1,177	1,177	609,238	1,109,352
8	3.2773	0	0	0	0	1,177	1,177	610,415	1,665,794
9	3.6051	0	0	0	0	1,177	1,177	611,592	1,833,667
10	3.8537	0	0	0	0	1,177	1,177	612,768	1,961,385
11	4.1840	0	0	0	0	1,177	1,177	613,945	2,130,781
12	4.8814	0	0	0	0	1,177	1,177	615,122	2,487,284
13	5.1138	0	0	0	0	1,177	1,177	616,298	2,606,959
14	5.2356	0	0	0	0	1,177	1,177	617,475	2,670,234
15	5.2356	0	0	0	0	1,177	1,177	618,652	2,671,411
16	5.2356	0	0	0	0	1,177	1,177	619,828	2,672,587
17	5.2356	0	0	0	0	1,177	1,177	621,005	2,673,764
18	5.2356	0	0	0	0	1,177	1,177	622,181	2,674,941
19	5.2356	0	0	0	0	1,177	1,177	623,358	2,676,117
20	6.6799	0	0	0	0	1,177	1,177	624,535	3,415,858
21	9.7162	0	0	0	0	1,177	1,177	625,711	4,970,232
22	10.7389	0	0	0	0	1,177	1,177	626,888	5,494,714
23	16.1084	0	0	0	0	1,177	1,177	628,065	8,243,837
24	17.3475	0	0	0	0	1,177	1,177	629,241	8,879,245
25	20.2387	0	0	0	0	1,177	1,177	630,418	10,360,492
26	20.2387	0	0	0	0	1,177	1,177	631,595	10,361,669
27	24.2865	0	0	0	0	1,177	1,177	632,771	12,435,414
28	----	0	0	0	0	1,177	1,177	633,948	----
29	----	0	0	0	0	1,177	1,177	635,125	----

[a] Undergraduate Pilot Training.

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APPENDIX C: COMMERCIAL AIRLINE PAY

Table C-1. Two Alternative Airline Pay Schedules

Yrs W/Airline[a]	United[b]	FAPA[c]
0	$25,197	$22,000
1	28,801	36,000
2	37,197	40,000
3	40,800	43,000
4	44,404	45,000
5	66,456	50,000
6	73,766	62,000
7	68,730	72,000
8	70,312	80,000
9	76,462	100,000
10	77,548	103,000
11	86,908	106,000
12	86,908	109,000
13	86,908	112,000
14	86,908	117,000
15	93,825	121,000
16	104,935	125,000
17	104,935	127,000
18	112,414	135,000
19	112,414	138,000
20	123,870	140,000
21	123,870	142,000
22	123,870	145,000
23	123,870	147,000
24	134,035	150,000
25	134,035	152,000
26	134,035	155,000
27	134,035	157,000
28	134,035	160,000
29	134,035	160,000

[a]Years with airline.

[b]United: Airline pay from 1985 United Airlines Inc., union contract and adjusted for inflation through 1987 as called for by contract.

[c]FAPA: 1987 FAPA projection of airline pay.

APPENDIX D: OFFICER COMPENSATION AND PILOT INVENTORY

Table D-1. Regular Military Compensation (RMC) Table[a]

	Years of service						
Grade	Und 2	2	3	4	6	8	10
Col	53,653[b]	53,653	53,653	53,845	53,845	53,845	53,845
LtCol	38,805	43,579	46,022	46,097	46,080	45,991	47,180
Maj	33,771	38,569	40,386	40,392	40,934	42,289	44,575
Capt	30,318	32,841	34,414	37,010	38,299	39,338	40,996
1Lt	25,969	27,752	31,957	32,742	33,249	33,249	33,249
2Lt	22,286	22,924	26,624	26,624	26,624	26,624	26,624

	Years of service						
Grade	12	14	16	18	20	22	26
Col	53,704	55,038	61,722	64,079	65,124	67,965	72,349
LtCol	49,284	52,078	55,357	57,936	59,301	60,881	60,881
Maj	46,655	48,460	50,288	51,494	51,494	51,494	51,494
Capt	42,631	43,512	43,512	43,512	43,512	43,512	43,512
1Lt	33,249	33,249	33,249	33,249	33,249	33,249	33,249
2Lt	26,624	26,624	26,624	26,624	26,624	26,624	26,624

[a]Data provided by AF/DPXA at the Pentagon.

[b]RMC is comprised of basic pay, BAQ, BAS, and the marginal tax advantage occuring from BAQ and BAS.

Table D-2. Objective Force Pilot Inventory Profile[a]

YOS	2Lt	1Lt	Capt	Maj	LtCol	Total
1	-	-	-	-	-	0
2	1,491	-	-	-	-	1,491
3	7	1,469	-	-	-	1,476
4	7	1,458	-	-	-	1,465
5	-	37	1,442	-	-	1,479
6	-	-	1,514	-	-	1,514
7	-	-	1,444	-	-	1,444
8	-	-	1,290	1	-	1,291
9	-	-	1,170	8	-	1,178
10	-	-	1,072	25	-	1,097
11	-	-	820	215	-	1,035
12	-	-	95	883	2	980
13	-	-	-	931	10	941
14	-	-	-	894	22	916
15	-	-	-	857	39	896
16	-	-	-	562	317	879
17	-	-	-	230	630	860
18	-	-	-	201	629	830
19	-	-	-	179	594	773
20	-	-	-	130	488	618
21	-	-	-	-	360	360
22	-	-	-	-	198	198
23	-	-	-	-	133	133
24	-	-	-	-	98	98
25	-	-	-	-	72	72
26	-	-	-	-	52	52
27	-	-	-	-	38	38
28	-	-	-	-	13	13
Total	1,505	2,964	8,847	5,116	3,695	22,127

[a]Data provided by AF/DPXA at the Pentagon.